FIVE-YEAR REVIEW REPORT FOR KERR-MCGEE CHEMICAL CORPORATION SUPERFUND SITE CARIBOU COUNTY, IDAHO

Prepared by:
CH2MHILL
Boise, Idaho

Prepared for:
U.S. Environmental Protection Agency
Region 10
Seattle, Washington

Cami Grandinetti

Cami Grandinetti, Program Manager
Remedial Cleanup Program
Office of Environmental Cleanup
USEPA Region 10

9/26/12

Date

Contents

Appendices

Tables

Figures

Acronyms and Abbreviations

µg/L	micrograms per liter
bgs	below ground surface
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
DEQ	Idaho Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
HDPE	high-density polyethylene
KMCC	Kerr-McGee Chemical Corporation
MCL	maximum contaminant level
NCP	National Contingency Plan
NPL	National Priorities List
O&M	operation and maintenance
OU	Operable Unit
RAO	remedial action objective
ROD	Record of Decision
Site	Kerr-McGee Chemical Corporation Superfund Site
S-X	solvent extraction
TBP	tributyl phosphate
TPH	total petroleum hydrocarbons
Trust	Greenfield Environmental Multistate Trust, LLC

Executive Summary

This report presents the findings of the third Five-Year Review performed for the Kerr-McGee Chemical Corporation Superfund Site in Soda Springs, Idaho (the Site). The Five-Year Review was conducted to determine if human health and the environment are being protected through the implementation of the selected remedy.

The remedial action for the site included the following:

- Elimination of uncontrolled liquid discharges from the industrial facility
- Placing solids from the ponds at an onsite landfill
- Capping of the windblown calcine, roaster reject, reject fertilizer, and active calcine Semi-annual groundwater monitoring to determine the effectiveness of source control measures in achieving risk-based groundwater performance standards
- Establishment of institutional controls in areas downgradient of the industrial facility to prevent ingestion of groundwater for as long as the groundwater exceeds the risk-based groundwater performance standards.

A Record of Decision (ROD) Amendment was signed on July 13, 2000, which changed the remedy for the reuse/recovery of the calcine solids. The final remedy selection included capping of the calcine, roaster reject, and rejected (off-specification) fertilizer.

The Five-Year Review was conducted in accordance with the U.S. Environmental Protection Agency (EPA) *Comprehensive Five-Year Review Guidance (*EPA, 2001) and included the following:

- Review of site data to evaluate compliance with the risk-based groundwater performance standards specified by the ROD and the current arsenic Maximum Contaminant Level (MCL).
- A site inspection to evaluate whether the remedy is operating and being maintained consistent with the ROD objectives and requirements
- Review of federal and state regulations promulgated since the last Five-Year Review that could affect the remedy's overall protectiveness with respect to performance standards specified in the ROD
- Interviews with site stakeholders to obtain their appraisal of how the remedy is performing and to identify concerns or suggestions that EPA may not otherwise be aware of.

The results of this Five-Year Review indicate that the remedy for the site was constructed in accordance with the requirements of the ROD; however, the remedy does not currently protect human health and the environment. Concentrations of contaminants of concern (COCs) in groundwater remain above the risk-based groundwater performance standards and trends indicate that cleanup goals will not be achieved in the foreseeable future. This information suggests the sources of COCs may still exist at the Site. Proprietary and Institutional Controls, including proprietary controls needed to protect against the use of groundwater with contaminant levels above risk-based groundwater performance standards, have not been fully developed and implemented on Greenfield Environmental Multistate Trust, LLC (Trust)-owned property. Institutional Controls have not been established or implemented for locations downgradient of the industrial facility where COCs exceed MCLs or risk-based groundwater performance standards. The contaminated groundwater may present a threat to human users of domestic wells downgradient of the industrial facility. Additionally, the extent of COC plumes originating at the Site is not well defined. Onsite fences surrounding the landfill and calcine caps that were established to restrict access to the remedy require repairs in specific areas. Vanadium levels at Finch Spring have increased 150 percent since the ROD was signed, raising questions about current ecological risks. To address these issues, the following actions should be taken:

1. Investigate and characterize possible additional sources of site-related COCs within the former Kerr-McGee facility.
2. Establish proprietary controls for Trust-owned property.

3. Develop an Institutional Control Plan and implement institutional controls governing groundwater use at locations downgradient of the industrial facility where COCs are known to exceed MCLs or risk-based groundwater performance standards.
4. Investigate current (and potential future) usage of domestic wells downgradient of the industrial facility and their relationship to the groundwater plume(s).
5. Augment/expand existing groundwater monitoring network and/or perform additional characterization work to better define plumes.
6. Repair identified fence sections located at the landfill and calcine caps.
7. Develop and implement a facility-wide O&M Plan.
8. Evaluate potential risks to ecological receptors in areas downgradient from the industrial facility.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Kerr-McGee Chemical Corporation (Soda Springs)		
EPA ID: IDD041310707		
Region: 10	**State:** Idaho	**City/County:** Soda Springs/Caribou
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA **If "Other Federal Agency" was selected above, enter Agency name:** Click here to enter text.		
Author name (Federal or State Project Manager): William Ryan		
Author affiliation: EPA Region 10		
Review period: October 2007 – September 2012		
Date of site inspection: June 12, 2012		
Type of review: Statutory		
Review number: 3		
Triggering action date: September 30, 2007		
Due date *(five years after triggering action date)*: September 30, 2012		

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
N/A

Issues and Recommendations Identified in the Five-Year Review:

OU(s): N/A	Issue Category: Remedy Performance			
	Issue: Concentrations of COCs in groundwater and surface water remain above MCLs and risk-based groundwater performance standards. Groundwater and surface water monitoring trends indicate that performance standards will not be met in the foreseeable future.			
	Recommendation: Investigate and characterize possible additional sources of site-related COCs within the former Kerr-McGee facility.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Other	EPA	6/30/2014

Issues and Recommendations Identified in the Five-Year Review:

OU(s): N/A	Issue Category: Remedy Performance			
	Issue: Institutional Controls have not been fully developed or implemented on Trust-owned property.			
	Recommendation: Establish proprietary controls for Trust-owned property.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	Other	EPA	6/30/2014

Issues and Recommendations Identified in the Five-Year Review:

OU(s): N/A	Issue Category: Remedy Performance			
	Issue: Institutional Controls have not been established or implemented for locations downgradient of the industrial facility where COCs exceed MCLs or risk-based groundwater performance standards.			
	Recommendation: Develop an Institutional Control Plan and implement institutional controls governing groundwater use at locations downgradient of the industrial facility where COCs are known to exceed MCLs or risk-based groundwater performance standards.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	Other	EPA	6/30/2014

Issues and Recommendations Identified in the Five-Year Review:

OU(s): N/A	Issue Category: Remedy Performance			
	Issue: Potential for domestic well usage downgradient of the former Kerr-McGee site has been identified.			
	Recommendation: Investigate current (and potential future) usage of domestic wells downgradient of the industrial facility and their relationship to the groundwater plume(s).			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	Other	EPA	9/30/2013

Issues and Recommendations Identified in the Five-Year Review:

OU(s): N/A	Issue Category: Remedy Performance			
	Issue: Nature and extent of groundwater plumes of site-related COCs are not well defined, and the monitoring well network is not adequate to provide necessary information.			
	Recommendation: Augment/expand existing groundwater monitoring network and/or perform additional characterization work to better define plumes.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	Other	EPA	12/31/2013

Issues and Recommendations Identified in the Five-Year Review:

OU(s): N/A	Issue Category: Remedy Performance			
	Issue: Fencing surrounding the landfill and calcine cap needs repair.			
	Recommendation: Repair identified fence sections located at the landfill and calcine caps.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Other	EPA	12/31/2012

Issues and Recommendations Identified in the Five-Year Review:

OU(s): N/A	Issue Category: Remedy Performance			
	Issue: Current O&M Plan does not require routine monitoring in all capped areas.			
	Recommendation: Develop and implement a facility-wide O&M Plan.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Other	EPA	12/31/2012

Issues and Recommendations Identified in the Five-Year Review:

OU(s): N/A	Issue Category: Changed Site Conditions			
	Issue: Vanadium levels at Finch Spring have increased 150 percent since the ROD was signed, raising questions about current ecological risks.			
	Recommendation: Evaluate potential risks to ecological receptors in areas downgradient from the industrial facility.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Other	EPA	12/31/2014

Protectiveness Statement(s)

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
N/A	Not Protective	Click here to enter date.

Protectiveness Statement:

The remedy for the Kerr-McGee Chemical Corporation (KMCC) Site is currently not protective because of the following issues:

1. Concentrations of COCs in groundwater and surface water remain above MCLs and risk-based groundwater performance standards. Groundwater and surface water monitoring trends indicate that performance standards will not be met in the foreseeable future.
2. Institutional Controls have not been fully developed or implemented on Trust-owned property.
3. Institutional Controls have not been established or implemented for locations downgradient of the industrial facility where COCs exceed MCLs or risk-based groundwater performance standards.
4. Potential for domestic well usage downgradient of the former Kerr-McGee site has been identified.
5. Nature and extent of groundwater plumes of site-related COCs are not well defined, and the monitoring well network is not adequate to provide necessary information.
6. Fencing surrounding the landfill and calcine cap needs repair.
7. Current O&M Plan does not require routine monitoring in all capped areas.
8. Vanadium levels at Finch Spring have increased 150 percent since the ROD was signed, raising questions about current ecological risks.

The following actions need to be taken to ensure protectiveness:

1. Investigate and characterize possible additional sources of site-related COCs within the former Kerr-McGee facility.
2. Establish proprietary controls for Trust-owned property.
3. Develop an Institutional Control Plan and implement institutional controls governing groundwater use at locations downgradient of the industrial facility where COCs are known to exceed MCLs or risk-based groundwater performance standards.
4. Investigate current (and potential future) usage of domestic wells downgradient of the industrial facility and their relationship to the groundwater plume(s).
5. Augment/expand existing groundwater monitoring network and/or perform additional characterization work to better define plumes.
6. Repair identified fence sections located at the landfill and calcine caps.
7. Develop and implement a facility-wide O&M Plan.
8. Evaluate potential risks to ecological receptors in areas downgradient from the industrial facility.

1 Introduction

The purpose of this Five-Year Review is to determine whether the remedy at the Kerr-McGee Chemical Corporation (KMCC) Superfund Site (the site) is protective of human health and the environment. The methods, findings, and conclusions of this review are documented in this report. In addition, this report identifies issues identified during the review and recommended actions to address them (EPA, 2001).

This Five-Year Review report is prepared pursuant to Comprehensive Environmental Response and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

EPA interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This report documents the third Five-Year Review of the remedial actions implemented at the site. This review was conducted for the entire site from June 2012 through September 2012 by EPA. The Idaho Department of Environmental Quality (DEQ) is a support agency for this site and was involved in the development of this report. CH2M HILL provided support to the EPA in the data analysis, site inspection, and overall evaluation of the remedy for this Five-Year Review. This review is required by statute because the remedy was selected after October 17, 1986 and hazardous substances, pollutants or contaminants remain onsite above levels that allow for unlimited use and unrestricted exposure. This review and future reviews will be used to evaluate whether the remedy remains protective of human health and the environment and whether additional remedial action is necessary and appropriate. The triggering action for this review is the completion of the second Five-Year Review on September28, 2007.

2 Site Chronology

Table 1 presents a chronology of significant events related to the Site.

TABLE 1
Chronology of Site Events
Kerr-McGee Chemical Corporation Superfund Site, Soda Springs, Idaho

Event	Date
Potential environmental impact identified at site	April 1981
Preliminary Assessment by State of Idaho	May 1985
Site Investigation	April 1988
NPL listing	October 4, 1989
Remedial Investigation/Feasibility Study completed	September 25, 1995
Record of Decision (ROD) signed	September 28, 1995
Remedial design start	December 16, 1996
Remedial design completed	July 17, 1997
Remedial action start (construction start)	July 17, 1997
Consent Decree with PRP signed	August 21, 1997
ROD Amendment Issued	July 13, 2000
Construction complete	September 26, 2001
Vanadium plant dismantled	May 2002
First Five-Year Review completed	September 30, 2002
Constructed north infiltration basins	October 2002
Fertilizer building dismantled	June 2003
Reclaim stormwater runoff ponds constructed	October 2003
Reclaim 5-acre ponds constructed	October 2004
Constructed south infiltration basins and snow fencing	November 2004
KMCC purchased adjacent property	2004
KMCC reincorporates as Tronox, Inc.	March 2006
Second Five-Year Review completed	September 28, 2007
Tronox files for Chapter 11 bankruptcy	January 2009
Greenfield Environmental Multistate Trust, LLC. assumes ownership and responsibility for the site	February 2011

3 Background

The following sections presents a brief overview of specific physical characteristics, land and resource use, history of contamination, and the basis for action for the Site.

3.1 Physical Characteristics

The Site is located within Idaho's Bear River Basin which is characterized by broad, flat valleys with a few scattered topographic features that include cinder cones, rhyolitic domes, and uplifted fault blocks. The Site lies in a valley at approximately 6,000 feet above mean sea level in elevation. The valley is bordered by northwest trending mountain ranges reaching approximately 8,000 feet above mean sea level in elevation.

The northern boundary of the Bear River Basin drainage basin is formed by the Blackfoot Reservoir, located approximately 13 miles north of the Site. Surface drainage in the valley is predominantly to the south. The regional groundwater flow is north to south; however, the flow at the Site tends towards the west because of groundwater pumping by the Monsanto plant west of the site. Natural springs are important hydrologic features of the basin, and emerge at several locations to the ground surface as result of discharge from the underlying groundwater aquifer. The ROD specified that no floodplain zones, endangered species, or historical or archeological sites are known to exist in the immediate vicinity of the site. A review of current information from the Idaho Fish and Wildlife Office specified that the Canada Lynx is the only species on the threatened list for Caribou County. A small wetland (Finch Spring/Pond) is present approximately 1 mile south of the site.

3.2 Land and Resource Use

The industrial facility originally owned by KMCC is approximately 50 acres in size and is located approximately 3 miles north of Soda Springs, Idaho, on State Route 34. KMCC acquired approximately 547 acres of land to the south of the industrial facility where deed restrictions were placed due to elevated concentrations of Site-related contaminants. The area surrounding the Site is agricultural—primarily grain crops. Directly across State Route 34 to the west is the large Monsanto Corporation phosphate processing plant. The entire area north of Soda Springs is rural in nature (see Figure 1—all figures are located at the end of this report ahead of the appendices).

Groundwater is the main source of drinking water in the vicinity of the Site, with Foundation Spring and Lower Ledger Spring serving as the sources of drinking water for the City of Soda Springs. Foundation Spring is located northeast of the industrial facility and Upper and Lower Ledger Springs are located to the south of the industrial facility. Water quality sampling from 1990 through 2011 has shown Site-related contaminant concentrations to be extremely low at Upper and Lower Ledger Springs, well below risk based performance standards established for the Site and maximum contaminant levels (MCLs) (not detected in many cases). Additionally, a number of domestic water wells are located in the vicinity of the Site, some of which are located downgradient of the industrial facility.

In January 2009, Tronox, Inc. (owners and operators of the site) filed for Chapter 11 bankruptcy. As part of the resolution of the bankruptcy, Tronox ceased operations at the site and established, with the United States, the State of Idaho and other States, an environmental response trust which is associated with the Soda Springs site as well as others. Property formerly owned by Tronox near Soda Springs is currently owned and maintained by the Greenfield Environmental Multistate Trust LLC (Trust) for the benefit of the United States and the State of Idaho. The Trust is responsible for activities related to the Site.

3.3 History of Contamination

KMCC operated a vanadium production facility in Caribou County beginning in March 1964. KMCC used large unlined constructed ponds and impoundments onsite to manage their process wastes. The two main ponds experienced significant containment failures, including the loss of approximately 2.5 million gallons from the solvent extraction (S-X) pond in April 1981. A site investigation conducted in April 1988 identified hazardous

substances in waste ponds onsite including arsenic, cadmium, chromium, lead, and organic compounds. Pond failures totaling approximately 750,000 gallons were documented in September and November 1989.

The Site was placed on the National Priorities List (NPL) on October 4, 1989. The Remedial Investigation and Feasibility Studies, which focused only on non-operational areas of the site (e.g., ponds, surface impoundment areas), were completed by KMCC on June 15, 1995. The ROD was signed on September 28, 1995, and a Consent Decree implementing the remedy required by the ROD was entered by the court on August 21, 1997. The vanadium plant was closed in January 1999 because of economic considerations and was fully dismantled by June 2002.

The footprint of the vanadium plant was covered with limestone fines and recontoured to provide positive drainage away from the site of the former plant. The fertilizer plant, constructed in 1997 to reuse/recycle calcine tailings and roaster rejects, was shut down in the second quarter of 2002 and subsequently dismantled. The surface footprint was subsequently regraded.

The vanadium processing created three different waste streams which were liquefied for transport and were originally discharged to unlined ponds on the property (Figure 2). The three waste stream ponds are identified as follows:

- Calcine Ponds
- Scrubber Pond
- S-X Pond

Calcine is a generic term for the fine-grained, black, sandy material that is the major byproduct of the vanadium production. Calcine tailings were originally impounded on the west side of the plant for the first 10 years of operation. Then, in 1973, this impoundment was covered with topsoil and seeded to prevent windblown fugitive dust. The calcine tailings were then shifted to diked ponds on the eastern side of the plant.

The waste byproducts of vanadium production (calcine and S-X solids) were transported to the three different ponds using water. The carrier water likely interacted with the solids in the unlined ponds, and contaminants leached into the local groundwater. The following six contaminants of concern (COCs) were identified through the risk assessment process:

- Arsenic
- Manganese
- Molybdenum
- Vanadium
- Tributyl phosphate (TBP)
- Total petroleum hydrocarbons (TPH)

The groundwater beneath and downgradient from the Site exists predominantly within the basalt sequences. The underlying Salt Lake Formation, is approximately 230 feet below ground surface (bgs). The basalt sequence is comprised of five basalt flows. At the Site, the hydraulic conductivities within the five basalt flows are variable. Water quality and aquifer test data indicate that the entire thickness of saturated basalt is in relatively good vertical hydraulic connection over the entire site. Faults in the basalt flows represent potential zones of increased transmissivity and may help to explain the flow of contaminants downgradient.

Groundwater monitoring wells are screened at three levels: (1) shallow (10 foot screens ranging from 35 to 73 feet bgs), (2) intermediate (125 to 150 feet bgs), and (3) deep (20 foot screens ranging from 153 to 214 feet bgs). The regional groundwater flow is north to south; however, the flow at the Site tends towards the west because of groundwater pumping by the Monsanto plant west of the site. Once the contaminants enter a fault in the basalt formation the flow potentially follows the easier pathway which is southerly. Groundwater monitoring also indicates that some of the groundwater reaches the surface water (Upper and Lower Ledger Springs, Big Spring, and Finch Spring). Upper and Lower Ledger Springs currently serve as sources of drinking water for Soda Springs.

3.4 Initial Response

No response actions were conducted prior to the signing of the ROD.

3.5 Basis for Taking Action

The basis for taking action at this site was primarily due to the human health risks associated with the contaminated groundwater originating from the Site. Some risk to human health was also associated with ingestion or direct contact with roaster reject material having high vanadium concentrations. Both of these sources are addressed in the ROD.

Table 2 presents a summary of groundwater concentrations and MCLs or risk based performance standards established in the ROD. The groundwater data presented in Table 2 was collected from well KM-8, located southwest of the S-X Pond within the industrial site boundary, where the highest Site-related contaminant levels have been measured from the early 1990s through 2011.

TABLE 2
Concentrations of COCs and Risk Based Performance Standards
Kerr-McGee Chemical Corporation Superfund Site, Soda Springs, Idaho

COC	Risk Based Performance Standard (µg/L)	Highest Concentration RI/FS to Present (µg/L)	Current (October 2011) Highest Concentration (µg/L)	Location of Current Highest Concentration
Arsenic	50*	150	53	KM-8
Manganese	180	8,770	6,800	KM-8
Molybdenum	180	165,000	42,000	KM-8
Vanadium	260	28,600	13,000	KM-8
TBP	180	4,442	850	KM-8
TPH	730 (0.73 mg/L)	9.5	1900 (1.9 mg/L)	KM-8

Notes:
* The arsenic maximum concentration level was 50 µg/l at the time the ROD was issued. It was subsequently revised in 2001 to 10 µg/L.

4 Remedial Actions

This section describes the remedial action objectives (RAOs), the remedy selected to meet the RAOs, remedy implementation, and operations and maintenance (O&M).

4.1 Remedial Action Objectives

The RAOs for the Site are as follows:

- Prevent the transport of COCs from facility sources to the groundwater that may result in COC concentrations in groundwater exceeding risk-based groundwater performance standards or maximum concentration levels (MCLs) for drinking water.
- Prevent ingestion by humans of groundwater containing COC having concentrations exceeding risk-based groundwater performance standards or MCLs.
- Prevent transport of COCs from groundwater to surface water in concentrations that may result in exceedances of risk-based groundwater performance standards or MCLs in the receiving surface water body.
- Prevent the ingestion/direct contact with the roaster reject area material having vanadium concentrations in excess of 14,000 milligrams per kilogram.
- The ultimate goal of the remedial action is to restore groundwater that has been impacted by site sources to meet all risk-based groundwater performance standards or MCLs for the COCs.

4.2 Remedy Selection

The ROD for the Site was signed on September 28, 1995, and amended on September 13, 2000. The selected remedy addresses the three pathways of concern: groundwater, roaster reject, and windblown calcine. The remedy selected for groundwater included elimination of uncontrolled liquid discharges from the Site (the main source of groundwater impacts), recycling of solid sources (later amended), groundwater monitoring, and institutional controls.

The Remedial Action for the Site selected in the ROD included the following:

- Elimination of uncontrolled liquid discharges from the site
- Placing solids from the ponds at an onsite landfill
- In-place capping of the windblown calcine, roaster reject, reject fertilizer, and active calcine tailings
- Semi-annual groundwater monitoring for the COCs to determine the effectiveness of source control
- Establishment of institutional controls (deed restrictions, limit Site access, well restrictions and/or well-head protection) in affected areas downgradient of the industrial facility to prevent ingestion of groundwater for as long as the groundwater exceeds the risk-based concentrations

The ROD contains a provision whereby the remedy and/or performance standards are to be reevaluated should contaminant levels in groundwater cease to decline and/or remain constant at levels higher than the remediation goal over some portion of the plume.

As part of the overall site strategy, although not part of the selected remedy, KMCC developed a waste minimization/treatment plan to eliminate liquid discharges to groundwater from the facility within 2 years. The plan was submitted to EPA and DEQ. The plan included the following:

- Construction of new lined ponds to contain the main source of groundwater contamination (S-X raffinate that discharged to leaking unlined ponds)

- Construction and operation of a phosphoric acid plant to consume scrubber water and calcine tailings to produce phosphoric acid, ammoniated phosphate, and gypsum fertilizers as marketable products

A ROD Amendment was signed on September 13, 2000, that changed the remedy for the reuse/recycling of the calcine tailings and roaster reject materials for use as fertilizer to containment. The fertilizer process did not prove successful and the capping alternative for this waste material (which was included in the feasibility study) was subsequently selected as part of the remedy for the site. The final remedy selection included capping of the calcine, roaster reject, and rejected (off-specification) fertilizer. The amended remedy also called for establishing institutional controls to prohibit activities on the capped area that could lead to unacceptable exposures to COCs.

All elements of the selected remedy, except the establishment of institutional controls, have been completed.

4.3 Remedy Implementation

A Consent Decree signed by EPA and KMCC was entered into court on August 21, 1997, in which KMCC agreed to implement the ROD and pay past and future EPA costs.

The remedial action implementation took place in two parts because of the ROD Amendment. The initial remedial action construction activity was the building of an onsite landfill for the S-X and scrubber pond solids. The remedial design was started on December 16, 1996, and completed on July 17, 1997, which implemented all remedy requirements in the ROD except the Institutional Controls. The construction process began on July 17, 1997, and was functionally completed on October 10, 1997. In accordance with the selected remedy, which required “elimination of the uncontrolled liquid discharges as soon as practicable,” the following actions were taken between 1995 and 1997:

- An onsite lined landfill was constructed to contain pond solids, and the three large unlined ponds were closed. The landfill was constructed with primary and secondary liners, leachate collection, and an engineered cover. Some of the waste in the ponds was saturated so the leachate is collected from a sump in the bottom liner.
- To support continuing operations, KMCC constructed three lined ponds totaling 20 acres to replace the S-X Pond, which was one of three identified sources of groundwater contamination. Two high-density polyethylene (HDPE) lined 5-acre ponds located north of the facility were constructed in 1996. An additional 10-acre HDPE-lined pond was constructed during August 1997. The S-X Pond was also located originally on the west side of the facility. The pond was taken out of service in 1995 and the location filled and planted. Sediments that were excavated from the pond were transported and contained in the onsite landfill with the scrubber pond sediments.
- The Scrubber Pond, an identified second source of ground water contamination, was replaced by adding two baghouse systems to the plant. The Scrubber Pond was located on the southeast corner of the facility, directly south of the recently capped calcine waste. The Scrubber Pond was operational for 22 years before the scrubbers were replaced by the baghouse. The sediments from the Scrubber Pond were removed and combined with the S-X waste sediment and contained onsite in the lined engineered landfill.
- The third source, calcine tailings placed in unlined ponds, was to be addressed by excavation and reuse/recycling. Reuse/recycling was found to be impractical and cost-prohibitive, and EPA issued an Amended ROD to change the remedy to another alternative evaluated in the Feasibility Study—consolidation and capping.

The ROD Amendment required some additional design work to consolidate the calcine waste stream and rejected fertilizer into a containment area and then cap. This waste stream ceased with the end of vanadium production in 1999, and the design and construction of the cap was initiated. The design of the calcine cap was received by EPA on February 18, 2001, and the design was finalized on May 4, 2001. The CERCLA engineered low-permeability multi-layered cap over the calcine tailings was constructed in 2001.

The construction of the cap over the calcine landfill began with the regrading of the calcine pile beginning on May 8, 2001. The rejected fertilizer had been returned to the calcine pile in October 2000 in preparation of the capping action. The calcine waste containment area was covered with a medium weight plastic flexible membrane liner, geocomposite, subsoil, and topsoil. Fencing and seeding were the last actions and were completed in

August 2001. An EPA construction Preliminary Close Out Report was completed on September 26, 2001, documenting that all the landfill caps were operational and functional and construction of the remedy was complete.

Institutional controls identified in the ROD included deed restrictions, limiting access, and well restrictions and/or well-head protection to prevent human ingestion of contaminated groundwater and prevent wells from being developed as sources of drinking water within the area of contamination. Additionally, institutional controls were required in the ROD amendment to prohibit activities on the capped area that could result in an unacceptable exposure to the COCs.

KMCC was responsible for implementation, monitoring and enforcement of the Institutional Controls. Implementation of institutional controls included the purchase of the Hopkins property south of the Site in order to gain control over the potential use of impacted groundwater. The contamination now extends beyond the former Hopkins property and onto City property. Other impacted properties include the rail road right-of-way and the State Route 34 right-of-way, both of which have tight controls over any potential subsurface explorations that could expose impacted groundwater. To restrict access, portions of the facility are fenced. However, proprietary controls related to groundwater use on the former industrial site were never developed or implemented. Similarly, no institutional controls have been established for areas downgradient of the facility overlying contaminated groundwater.

In 2002, an infiltration basin was constructed on the north side of the calcine containment area to capture precipitation runoff from the cap. In 2004, another infiltration basin was completed on the south side of the cap. After observing snow drifts piling on the cap and increasing the amount of percolation through the cap, a snow fence was erected along the south side of the facility in line with the cap.

Groundwater modeling performed for the RI/FS predicted that levels of all COCs would achieve the health-based performance standards following the completion of the source control actions. Current groundwater monitoring trends suggest that the performance standards for all COCs will not be achieved in the foreseeable future.

4.4 System Operations/Operation and Maintenance

The Trust is currently conducting long-term O&M at this Site. Currently semi-annual groundwater monitoring is occurring with reports sent to EPA. The cap and ponds are subject to an annual detailed inspection for cracking, animal burrows, settlement, and drainage as well as fence and gate condition. The O&M of the capped waste areas is limited to cap protection, cover crop, fencing, and erosion control. After the first year of installation, the scrubber/S-X landfill has not required any significant O&M to maintain the cap. Some O&M of the calcine cap was required because of first year erosion. Some over seeding and weed control was done on the cover crop. Remedy components are inspected on a routine basis, as defined in the O&M Plan for the remedy. Repairs to the remedy have been made when identified as being needed.

In addition, an extensive site inspection was conducted in 2008 as part of the follow-up actions to the 2007 Five-Year Review. This inspection included a detailed assessment of the condition of each cap and cover constructed as part of the remedy. Observations made during those inspections included the identification of erosion features, sparse vegetation, surface water ponding, and animal burrows. For those observations determined to pose a risk to the protectiveness of the remedy, actions were taken to address them (e.g. animal burrows were filled).

It was also determined that many of the cover issues identified during the inspection were at locations that are not covered by routine monitoring in the existing O&M Plan. In order to ensure that O&M practices are implemented in a manner that ensures the long-term integrity and functionality of the current remedy, it was recommended that the O&M Plan be expanded to cover the entire.

5 Progress Since Last Five-Year Review

The second Five-Year Review was completed in 2007. Section 5.1 summarizes the findings of the 2007 Five-Year Review. Section 5.2 describes the actions taken since the 2007 Five-Year Review was completed.

5.1 2007 Five-Year Review Summary of Findings

The 2007 Five-Year Review Report confirmed that the remedy had been constructed as intended by the ROD and ROD Amendment. No changes had occurred in the physical conditions of the Site that would affect the protectiveness of the remedy. Monitoring of the groundwater, however, revealed that risk-based groundwater performance standards and MCLs were not being met and data trends were relatively flat, or increasing in some cases, such that remediation goals were not likely to be met for at least another 20 years. A determination of the protectiveness of the remedy was not made, as stated below:

> "A protectiveness determination of the remedy cannot be made until further information is obtained. Further information will be obtained by taking the following actions:
>
> - Evaluate practicability of remedy in achieving cleanup goals;
> - Evaluate adequacy of current groundwater monitoring network for identifying the offsite migration of COCs;
> - Assess whether current groundwater and surface water performance standards are still applicable; and
> - Work with the laboratory providing analytical services to reduce the groundwater detection and reporting limits to less than the MCL for arsenic."

5.2 Actions taken since 2007 Five-Year Review

Table 3 summarizes the actions taken in response to the recommendations/follow-up actions identified in the 2007 Five-Year Review.

TABLE 3
Actions Taken Since Last Five-Year Review
Kerr-McGee Chemical Corporation Superfund Site, Soda Springs, Idaho

Issues from Previous Review	Recommendations/Follow-up Actions	Party Responsible	Completion Date	Outcome
Concentrations of COCs in groundwater and surface waters remain above risk-based groundwater performance standards and are exhibiting either flat or upward trends.	Evaluate the practicability of remedy in achieving cleanup goals.	Tronox/ Trust	1/20/2012	Identified the need for additional source characterization work and development of Institutional Controls.
Concentrations of COCs in groundwater and surface waters remain above risk-based groundwater performance standards and are exhibiting either flat or upward trends.	Evaluate adequacy of current groundwater monitoring network for identifying the offsite migration of COCs.	Tronox	12/3/2010	Identified the need to expand the monitoring network to better characterize the extent of downgradient plumes
Concentrations of COCs in groundwater and surface waters remain above risk-based groundwater performance standards and are exhibiting either flat or upward trends.	Assess whether current groundwater and surface water performance standards are still applicable.	EPA	10/23/2008	Concluded no changes to risk-based groundwater performance standards were warranted
The routine laboratory reporting limit for arsenic in groundwater is greater than the updated MCL.	Work with the laboratory providing analytical services to reduce the groundwater detection and reporting limits to less than the MCL for arsenic.	Tronox	3/30/2008	Laboratory reporting limit for arsenic reduced to level below the MCL.

An addendum to the 2007 Five-Year Review was planned upon the completion of the follow-up actions identified in that review. However, due to delays in completing the work (due in large part to the Tronox bankruptcy), it was determined that an amendment would not be prepared and the information developed from the follow-up actions would be used to support this review.

6 Five-Year Review Process

Section 6 addresses the activities completed as part of the Five-Year Review.

6.1 Administrative Components

This Five-Year Review was conducted by EPA Region 10 staff with the assistance of CH2M HILL under EPA Contract 68-S7-04-01 and representatives from the Idaho Department of Environmental Quality. The review was conducted consistent with EPA's Comprehensive Five-Year Review Guidance (U.S. EPA, 2001). The evaluation was performed between June and September 2012.

6.2 Community Notification and Involvement

The Trust was notified of the initiation of the Five-Year Review in 2011. On May 3, 2012, a public notice announcing the Five-Year Review for the site was published in the *Caribou County Sun* (Appendix A). The public notice solicited public comments related to the performance of the remedy for site. EPA received no responses from the public or any other entity. On June 12, 2012, the EPA, DEQ, and representatives from the Trust met with the Mayor of Soda Springs and other City representatives. The meeting was to inform City officials of the current Five-Year Review and discuss any pertinent information related to the Site. No detailed action items or updated information directly related to the Five-Year Review was identified at that meeting.

6.3 Supporting Documents

A review of reports pertinent to this Five-Year Review was conducted. The documents reviewed included the ROD (1995), the ROD Amendment (2000), 2012 annual monitoring data report (2012), Groundwater Monitoring Network Evaluation Report (2010), Remedy Evaluation Report (2012), and the second Five-Year Review (2007). The entire list of documents reviewed for this report is listed in Appendix B.

6.4 Data Review

The semi-annual water quality monitoring program has continued at the site since 1991. Sixteen groundwater monitoring wells and four surface water/springs are included in the monitoring program.

6.4.1 Water Quality Trends

Groundwater concentrations of site-related COCs decreased significantly at most monitoring locations during the period immediately following the implementation of the remedial actions in 1997. However, in many cases, trends have flattened and no groundwater or surface water cleanup goals have been met. In some locations, contaminant concentrations have actually increased.

During the second Five-Year Review period, groundwater trends for the COCs revealed vanadium, molybdenum, and manganese in many wells had remained above the risk-based groundwater performance standards and have exhibited flattened trends since the late 1990s. In some cases, concentrations of COCs at specific monitoring wells have been increasing over recent years. The highest concentrations for these contaminants were located generally downgradient of the former S-X pond and the former scrubber pond. Concentrations in groundwater monitoring wells remained above the risk-based groundwater performance standards and current arsenic MCL at locations downgradient of the industrial facility, and only molybdenum remains above the risk-based groundwater performance standard in downgradient springs.

Surface water and groundwater quality trends pertinent to this Five-Year Review period are discussed in the following text. Table 2 lists the ROD risk-based groundwater performance standards for surface water and groundwater. Figure 1 shows the location of ground water monitoring wells.

Arsenic

As shown in Figure 3, monitoring wells located near the former Scrubber Pond exhibit concentrations that are just above the MCL for arsenic of 10 µg/L —Well KM-2 (12 µg/L) and Well KM-3 (11 µg/L). The arsenic concentrations

have remained relatively flat since 2007. Note that the ROD identified an risk-based groundwater performance standard of 50 µg/l for arsenic, which was the established MCL at the time. For purposes of measuring progress toward restoring groundwater to its beneficial use as a drinking water source, groundwater concentrations of COCs are being compared in this review to the current arsenic MCL of 10 µg/l.

Figure 4 depicts the arsenic concentration trends of monitoring wells near the west side of the facility and near the former S-X Pond. Concentrations at these monitoring wells have decreased since 1995. Although arsenic concentrations have remained consistent since 2007, the concentrations are well below the MCL of 10 µg/L.

As shown in Figure 5, arsenic concentrations at Well KM-8 (currently 53 µg/L) remain well above the MCL of 10 µg/L. A decreasing arsenic trend in Well KM-8 was observed between 2008 and 2011. Arsenic concentrations in wells located offsite have been stable since 2007, as shown in Figure 6. Arsenic concentrations at these offsite monitoring wells are below the MCL of 10 µg/L.

Manganese

As shown in Figure 7, monitoring wells located near the former Scrubber Pond show variable manganese concentrations through the late 1990s, followed by decreasing concentrations to the present, with the exception of Well KM-3. Manganese concentrations in Well KM-3 have demonstrated a steady increasing trend from 2000 to present.

Figure 8 depicts manganese concentration trends at monitoring wells near the west side of facility and near the former S-X Pond. Manganese concentration trends at monitoring wells in this area are generally variable with multiple spikes in concentrations at Well KM-6 in 2006, 2009, and 2011. Concentrations at Well KM-6 (currently 210 µg/L) remain above the risk-based groundwater performance standard of 180 µg/L, whereas, manganese concentrations in the other wells have declined to levels below the risk-based groundwater performance standard.

As shown in Figure 9, concentrations of manganese in Well KM-8 (currently 6,800 µg/L) remain well above the risk-based groundwater performance standard and exhibit the highest concentrations at the Site. Manganese concentrations in Well KM-8 have been increasing since 2004. Concentrations of offsite wells have remained stable since 2004 and are below the risk-based groundwater performance standard of 180 µg/L (Figure 10).

Molybdenum

All monitoring wells located near the former Scrubber Pond exhibit molybdenum concentrations well above the risk-based groundwater performance standard of 180 µg/L (highest current level 5,800 µg/L). Concentrations at these wells have shown a very slight decreasing trend since 2000 as shown in Figure 11.

Similar to the monitoring wells located near the former Scrubber Pond, concentrations of molybdenum at monitoring wells near the west side of facility and near the former S-X Pond have exhibited a decreasing trend since 2000 (Figure 12). With the exception of Wells KM-9 and KM-19, all monitoring wells have concentrations that exceed the risk-based groundwater performance standard.

Molybdenum concentrations observed in Figure 13 for Well KM-8 show a decreasing trend from 1995 to 2005. Concentrations appear to be variable from 2005 to present with no overall trend. However, concentrations at Well KM-8 (currently 42,000 µg/L) remain the highest at the Site. As shown in Figure 14, concentrations of molybdenum have shown a decreasing trend at the offsite wells since 2003, although the decreasing trend has flattened from 2003 to the present.

Vanadium

As shown on Figure 15, vanadium concentrations in all monitoring wells near the former Scrubber Pond with the exception of Well KM-11 remain above the risk-based groundwater performance standards of 260 µg/L (highest current level 5,500 µg/L). A significant decreasing vanadium trend in the monitoring wells occurred after eliminating the uncontrolled discharges from the S-X and scrubber ponds up until about 2000. After 2000, decreasing trends have leveled off and concentrations have remained essentially stable.

As shown on Figure 16, west side Wells KM-5, KM-9, and KM-12 showed a significant decrease in concentrations during operations up to 1997. After 1997, the decreasing trend continued; however, the rate of decrease diminished substantially. Vanadium concentrations in Wells KM-7 and KM-6 have exhibited increases since 2004. Concentrations in deep Well KM-19 have generally remained stable and below the risk-based groundwater performance standard of 180 µg/L since 1997 as shown in Figure 16.

Vanadium concentrations at Well KM-8 have been highly variable throughout the period of study (Figure 17). A decrease in vanadium concentrations was observed from 1991 to 1995, a flattened trend from 1995 to 1999, an increasing trend from 1999 to 2004, and finally a decreasing trend from 2004 to the present. Concentrations of vanadium at Well KM-8 (currently 13,000 µg/L) remain the highest at the site and exceed the risk-based groundwater performance standard of 180 µg/L. Concentrations at the offsite wells remain above the risk-based groundwater performance standard, with the exception of Well KM-17 (Figure 18). Vanadium concentration trends at these offsite monitoring wells exhibited a decreasing trend.

Total Petroleum Hydrocarbons

Well KM-8 is the only well that is routinely sampled for TPH. Concentrations remained relatively stable from 1997 to 2000 with a significant increase from 2000 to 2002 (Figure 19). Concentrations of TPH from 2002 to the present are similar to those concentrations observed prior to 2000 and exhibit a relatively stable trend—remaining above the risk-based groundwater performance standard of 0.73 mg/L (current concentration 1.9 mg/L).

Tributyl Phosphate

Similar to TPH, Well KM-8 is the only well that is routinely sampled for tributyl phosphate. Concentrations of tributyl phosphate in Well KM-8 decreased through 2005 (Figure 20). Concentrations from 2005 to present appear to have a slight increase with seasonal fluctuations. Concentrations at Well KM-8 (currently 850 µg/L) remain above the risk-based groundwater performance standard of 180 µg/L.

Offsite Springs

Of the four offsite springs (Big Spring, Finch Springs, Upper Ledger, and Lower Ledger) sampled, Big Spring and Finch Spring have only shown historical exceedances of the risk-based groundwater performance standard for molybdenum. Concentrations of molybdenum in both Big Spring (located in the southern part of Soda Springs) and Finch Spring (north of Soda Springs) have shown a steady decline since 1998 (Figures 21 and 22). However, the trend has seen a flatting since about 2008. Current concentrations at both springs are below the molybdenum risk-based groundwater performance standard of 180 µg/L. All other COCs measured at offsite springs have consistently been below risk-based groundwater performance standards.

6.4.2 Groundwater Wells

A search of the Idaho Department of Water Resources (IDWR) database provided information on registered wells in the vicinity of the Site. Detailed information on the number of wells and their intended use was limited to Township, Range, and Sections. This information was assessed with respect to the locations of these wells and a rough estimate of where downgradient plumes of site-relate COCs are thought to exist. Acknowledging the high level of uncertainty of the plume locations and dimensions, available data suggests that there is a high likelihood that COC plumes may interact with or impact existing wells downgradient of the industrial facility, as depicted in Figure 23. The following types of wells are located in the specified search area boundary:

- 22 domestic wells
- 39 monitoring wells
- 5 test wells
- 1 industrial well
- 1 experimental well

The presence, location, and use of other unregistered wells are unknown.

6.5 Site Inspection

A site inspection was conducted on June 12, 2012, as part of the Five-Year Review process. The site visit was conducted to identify any problems associated with the remedy and ongoing site O&M including the integrity of the caps, the condition of the monitoring wells, and restrictive fencing.

The following individuals participated in the site visit:

- Bill Ryan—EPA Region 10, Remedial Project Manager
- Tim Mosko—CH2M HILL, Project Manager, EPA contractor
- Allan Erickson—CH2M HILL, EPA contractor
- John Brown—Greenfield Environmental Multistate Trust, LLC, consultant for the Trust
- Doug Tanner—DEQ
- Clyde Cody—DEQ

The site inspection was limited to the facility and offsite well locations. The only significant finding was the fencing surrounding the caps was observed to be compromised in multiple sections. A Site Investigation Checklist is included in Appendix C and provides additional details regarding the condition and performance of the remedy. Photographs from the site visit are included in Appendix D.

6.6 Interviews

Three people were interviewed as part of the Five-Year Review process. The interviews were conducted to identify successes or problems related to the remedy and O&M activities.

The following individuals were interviewed:

- **John Brown, Greenfield Environmental Multistate Trust, LLC.** Mr. Brown was contracted by Tronox to provide technical support for the initial investigations, remedy implementation, and O&M of the remedies. Currently, Mr. Brown is under contract to the Trust to provide technical support as described previously. Mr. Brown was interviewed during the June 12, 2012, site visit.
- **Alan Skinner, City of Soda Springs.** Mr. Skinner is employed by City of Soda Springs as the Director of City Services. Mr. Skinner was interviewed to provide information about current water distribution information and to identify any possible effects that the remedies could have on City of Soda Springs water service. No issues were identified. Mr. Skinner was interviewed during the June 12, 2012, site visit.
- **Kirk Hansen, Mayor of Soda Springs.** Mayor Hansen was briefed by EPA, DEQ, and the Trust on general activities at the Site and the development of the Five-Year Review. No issues specific to the Five-Year Review were identified. Mayor Hansen was interviewed during the June 12, 2012, site visit.

7 Technical Assessment

Section 7 presents a technical assessment of the remedy performance as implemented at the Site. As outlined in EPA's *Comprehensive Five-Year Review Guidance* (EPA, 2001), this assessment is structured to answer the following three questions:

- Is the remedy functioning as intended?
- Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?
- Has any other information come to light that could affect the remedy's protectiveness?

These questions are addressed in the following sections.

7.1 Question A: Is the remedy functioning as intended?

No. The remedy is currently not performing as intended based on a review of current groundwater data, the potential for groundwater usage and exposure to groundwater contamination downgradient of the facility, observations made during the June 12, 2012 site visit, a groundwater monitoring network that does not adequately characterize downgradient COC plumes, and the failure to fully implement Institutional Controls. While the various components of the remedy have been constructed as designed, groundwater monitoring data continue to reveal, after initially decreasing, COC trends that are relatively flat since the late 1990s and persist above the risk-based cleanup goals identified in the ROD. In some cases, trends for certain COCs at specific monitoring wells have been increasing over the last several years (see Section 6.4).

While capping and other remedial actions intended to achieve the RAO to minimize the migration of contaminants to groundwater have been implemented, the persistence of COCs above risk-based groundwater performance standards raises the uncertainty of the ability of the implemented remedy to achieve the goal of restoring groundwater impacted by site sources. Groundwater cleanup goals have not been achieved through 2011 and data suggests that those goals will not be achieved in the foreseeable future. Current COC trends in groundwater suggest that sources of COCs still exist at the Site. Such source areas may or may not include areas that have not been previously evaluated or addressed by the current remedy. Additionally, the extent of the groundwater contaminant plumes is currently not well defined and expansion of the groundwater monitoring network is warranted. Available data also suggest that there is the potential for human exposure to contaminated groundwater through the use of domestic wells downgradient of the facility. O&M of the remedy has continued according to the established schedule and practices but the O&M Plan does not cover all areas of the facility where waste has been contained in place.

The ROD included a requirement for KMCC to establish Institutional Controls as part of the remedy for the facility and for properties downgradient with underlying groundwater contamination. The ROD Amendment also added Institutional Controls to prohibit activities on capped areas that could result in an unacceptable exposure to or release of the contaminants of concern. The need for these controls remains. Of these controls (deed restrictions, limited access, well restrictions and/or well-head protection), only deed restrictions governing groundwater use for the property immediately south of the industrial facility (purchased by KMCC) have been established or implemented. As a consequence, there are no safeguards in place to restrict certain types of use of groundwater in locations where site-related COCs in groundwater exceed established risk-based cleanup standards or MCLs or activities on capped areas that could cause exposures or releases.

The contaminated groundwater discharges to four different surface water bodies. One of these springs, Big Spring, currently has concentrations below, but near, the risk-based groundwater performance standard for molybdenum. Two of these springs, Ledger Springs and Formation Springs, are currently domestic drinking water sources. Neither of these springs have been affected by the releases from the industrial facility.

Many of the cap issues identified during the inspection were at locations that are not covered by routine monitoring in the existing O&M Plan. In order to ensure that O&M practices are implemented in a manner that ensures the long-term integrity and functionality of the current remedy, it is recommended that the O&M Plan be expanded to address the Site as a whole.

In addition, based on observations made during the June 12, 2012 site visit, the fencing surrounding the landfill and calcine cap will need repairs on multiple sections.

7.2 Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

No. In general, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection are still valid. However, as identified in the 2007 Five-Year Review, the MCL for arsenic has been changed from 50 µg/L to 10 µg/L since the ROD was signed. Arsenic levels in one monitoring well near the S-X Pond (KM-8) has been well above 10 µg/L since 1995, and remains so through 2011. Two monitoring wells located near the former Scrubber Pond (Wells KM-2 and KM-3) have recent arsenic levels that exceed the MCL of 10 µg/L.

Twenty-one registered domestic wells have been identified utilizing IDWRs database located at http://www.idwr.idaho.gov/WaterManagement/WellInformation/DrillerReports/dr_default.htm. Available data suggests that there is a high likelihood that COC plumes may interact with or impact existing wells downgradient of the facility. The risk assessment conducted during the remedial investigation evaluated the future residential use of ground water at properties only adjacent to the Site and not down gradient in the residential areas of Soda Springs. Current information suggests that the plumes of site-related COCs may extend into the residential areas of Soda Springs, well beyond the areas considered in the risk assessment. Further, a focused assessment of ecological risks was conducted at Finch Spring in support of the ROD and concluded that no significant ecological risks existed at downgradient receptor locations. However, vanadium levels have increased significantly (approximately 150 percent) at Finch Spring, with a relatively flat trend since the early 2000s. This raises questions about whether the conclusions related to ecological risks from earlier work at Finch Spring (and other downgradient areas) remain valid or applicable.

7.3 Has any other information come to light that could affect the remedy's protectiveness?

Yes. Evaluation of the groundwater monitoring network conducted subsequent to the 2007 Five-Year Review revealed that the groundwater plumes of site-related COCs are not well defined. Consequently, the areas where potential exposures to contaminated groundwater may occur (i.e., areas where institutional controls may be needed) are not well defined.

Further, a wastewater detention pond (referred to as the 10-Acre Pond) was constructed by KMCC in 1997 on the eastern edge of the industrial facility. This pond, which is not part of the existing remedy, appears to be failing and may be contributing to groundwater contamination. The 10-Acre Pond will be evaluated as a potential source to groundwater contamination and options will be evaluated for closure or repair.

7.4 Technical Assessment Summary

The remedy is currently not performing as intended based on a review of current groundwater data, the potential for groundwater usage and exposure to groundwater contamination downgradient of the industrial facility, observations made during the June 12, 2012 site visit, a groundwater monitoring network that does not adequately characterize downgradient COC plumes, and failure to fully implement Institutional Controls. O&M practices are currently not applied to all capped areas. Additionally, the 10-Acre Pond, not part of the current remedy, appears to be failing and may be contributing to groundwater contamination.

In general, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection are still valid. However, as identified in the 2007 Five-Year Review, the MCL for arsenic has been

changed from 50 µg/L to 10 µg/L since the ROD. Also, COC levels in downgradient springs raise questions about whether ecological risks may exist in downgradient areas where it has previously been assumed that they do not exist.

In addition, the extent of the groundwater plumes of site-related COCs is not well defined. Consequently, the areas where potential exposures to contaminated groundwater may (i.e., areas where institutional controls may be needed) are not well defined and the ability of the remedy to achieve RAOs and the timeframe for doing so are in question.

8 Issues

Table 4 presents the issues identified in this Five-Year Review.

TABLE 4
Issues Potentially Affecting the Remedy's Current or Future Protectiveness
Kerr-McGee Chemical Corporation Superfund Site, Soda Springs, Idaho

Issue	Affects Current Protectiveness? (Yes/No)	Affects Future Protectiveness? (Yes/No)
(1) Concentrations of COCs in groundwater and surface water remain above MCLs and risk-based groundwater performance standards. Trends indicate that cleanup standards will not be met in the foreseeable future.	Yes	Yes
(2) Institutional Controls have not been fully developed or implemented on Trust-owned property.	Yes	Yes
(3) Institutional Controls have not been established or implemented for locations downgradient of the industrial facility where COCs exceed MCLs or risk-based groundwater performance standards,	Yes	Yes
(4) Potential for domestic well usage downgradient of the former Kerr-McGee facility has been identified.	Yes	Yes
(5) Nature and extent of groundwater plumes of site-related COCs are not well defined, and the monitoring well network is not adequate to provide necessary information.	Yes	Yes
(6) Fencing surrounding the landfill and calcine cap needs repair.	No	Yes
(7) Current O&M Plan does not require routine monitoring in all capped areas.	No	Yes
(8) Vanadium levels at Finch Spring have increased 150 percent since the ROD was signed, raising questions about current ecological risks.	Yes	Yes

9 Recommendations and Follow-up Actions

Table 5 lists the recommended follow-up actions related to the issues identified in Section 8.

TABLE 5
Recommendations/Follow-up Actions Regarding Issues Potentially Affecting the Remedy's Current or Future Protectiveness
Kerr-McGee Chemical Corporation Superfund Site, Soda Springs, Idaho

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions Affect Protectiveness? (Yes/No)	
					Current	Future
(1) Concentrations of COCs in groundwater and surface water remain above MCLs and risk-based groundwater performance standards. Ground water and surface water monitoring trends indicate that cleanup standards will not be met in the foreseeable future.	Investigate and characterize possible additional sources of site-related COCs within the former Kerr-McGee facility.	Trust	EPA	6/30/14	Yes	Yes
(2) Institutional Controls have not been fully developed or implemented on Trust-owned property.	Establish proprietary controls for Trust-owned property.	Trust	EPA	6/30/13	Yes	Yes
(3) Institutional Controls have not been established or implemented for locations downgradient of the industrial facility where COCs exceed MCLs or risk-based groundwater performance standards.	Develop an Institutional Control Plan and implement institutional controls governing groundwater use at locations downgradient of the industrial facility where COCs are known to exceed MCLs or risk-based groundwater performance standards.	Trust	EPA	9/30/13	Yes	Yes
(4) Potential for domestic well usage downgradient of the Kerr-McGee site has been identified.	Investigate current usage of registered domestic wells downgradient of the former Kerr-McGee facility and relationship to the groundwater plume(s).	Trust	EPA	9/30/13	Yes	Yes
(5) Nature and extent of groundwater plumes of site-related COCs are not well defined, and the monitoring well network is not adequate to provide necessary information.	Augment/expand existing groundwater monitoring network and/or perform additional characterization work to better define plumes.	Trust	EPA	12/31/13	Yes	Yes
(6) Fencing surrounding the landfill and calcine cap needs repair.	Repair identified fence sections located at the landfill and calcine caps.	Trust	EPA	12/31/12	No	Yes
(7) Current O&M Plan does not require routine monitoring in all capped areas.	Develop and implement a facility-wide O&M Plan.	Trust	EPA	9/30/13	No	Yes
(8) Vanadium levels at Finch Spring have increased 150 percent since the ROD was signed, raising questions about current ecological risks.	Evaluate potential risks to ecological receptors in areas downgradient from the industrial facility.	Trust	EPA	12/31/14	Yes	Yes

10 Protectiveness Statement

The remedy for the KMCC Site is currently not protective because of the following issues:

1. Concentrations of COCs in groundwater and surface water remain above MCLs and risk-based groundwater performance standards. Groundwater and surface water monitoring trends indicate that performance standards will not be met in the foreseeable future.
2. Institutional Controls have not been fully developed or implemented on Trust-owned property.
3. Institutional Controls have not been established or implemented for locations downgradient of the industrial facility where COCs exceed MCLs or risk-based groundwater performance standards.
4. Potential for domestic well usage downgradient of the former Kerr-McGee site has been identified.
5. Nature and extent of groundwater plumes of site-related COCs are not well defined, and the monitoring well network is not adequate to provide necessary information.
6. Fencing surrounding the landfill and calcine cap needs repair.
7. Current O&M Plan does not require routine monitoring in all capped areas.
8. Vanadium levels at Finch Spring have increased 150 percent since the ROD was signed, raising questions about current ecological risks.

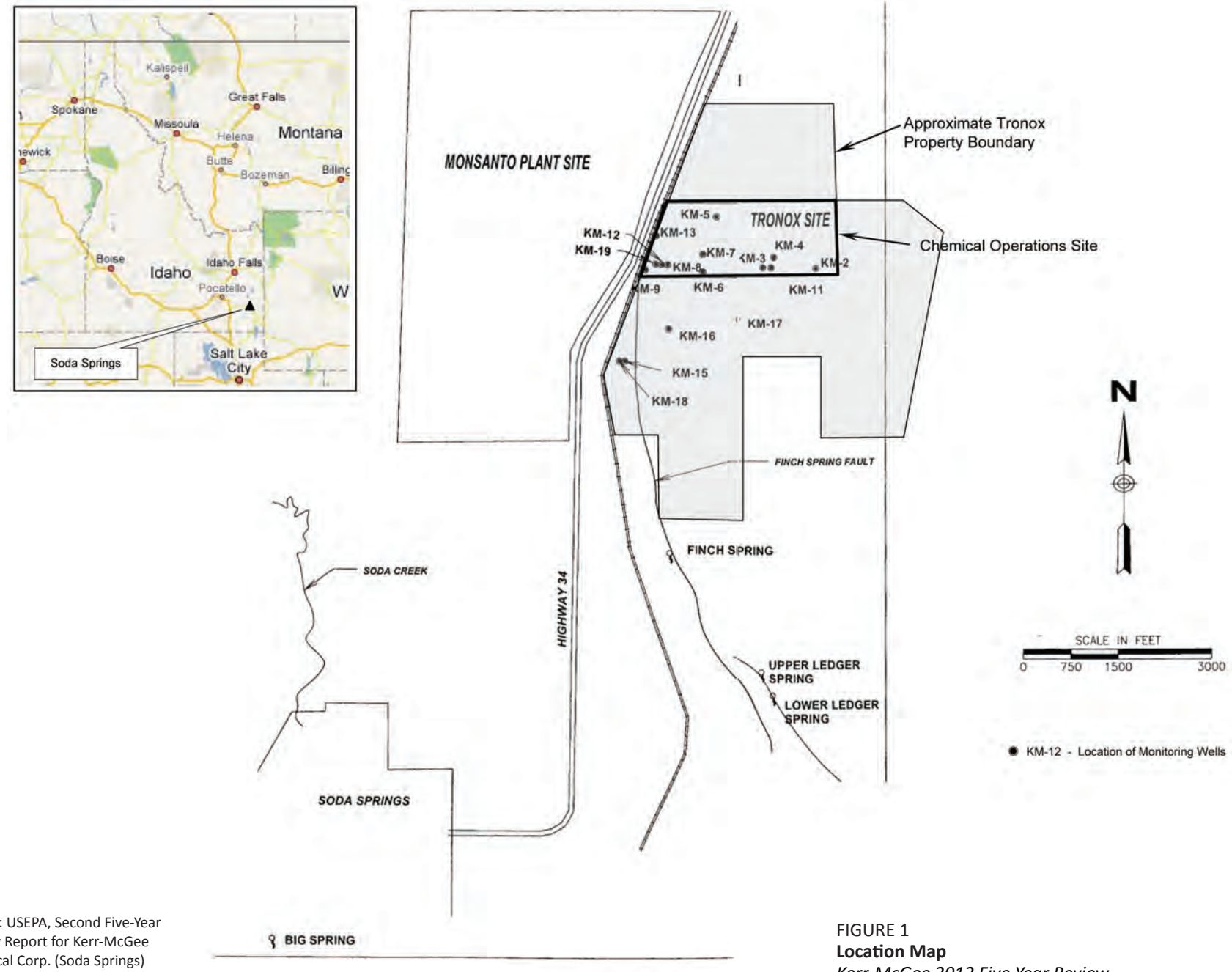
The following actions need to be taken to ensure protectiveness:

1. Investigate and characterize possible additional sources of site-related COCs within the former Kerr-McGee facility. If source areas are identified and characterized, evaluate need to modify the existing remedy.
2. Establish proprietary controls for Trust-owned property.
3. Develop an Institutional Control Plan and implement institutional controls governing groundwater use at locations downgradient of the industrial facility where COCs are known to exceed MCLs or risk-based groundwater performance standards.
4. Investigate current (and potential future) usage of domestic wells downgradient of the industrial facility and their relationship to the groundwater plume(s).
5. Augment/expand existing groundwater monitoring network and/or perform additional characterization work to better define plumes.
6. Repair identified fence sections located at the landfill and calcine caps.
7. Develop and implement a facility-wide O&M Plan.
8. Evaluate potential risks to ecological receptors in areas downgradient from the industrial facility.

11 Next Review

The next Five-Year Review for the Site is required by September 2017.

Figures



Source: USEPA, Second Five-Year Review Report for Kerr-McGee Chemical Corp. (Soda Springs) Superfund Site, September 2007.

FIGURE 1
Location Map
Kerr-McGee 2012 Five Year Review

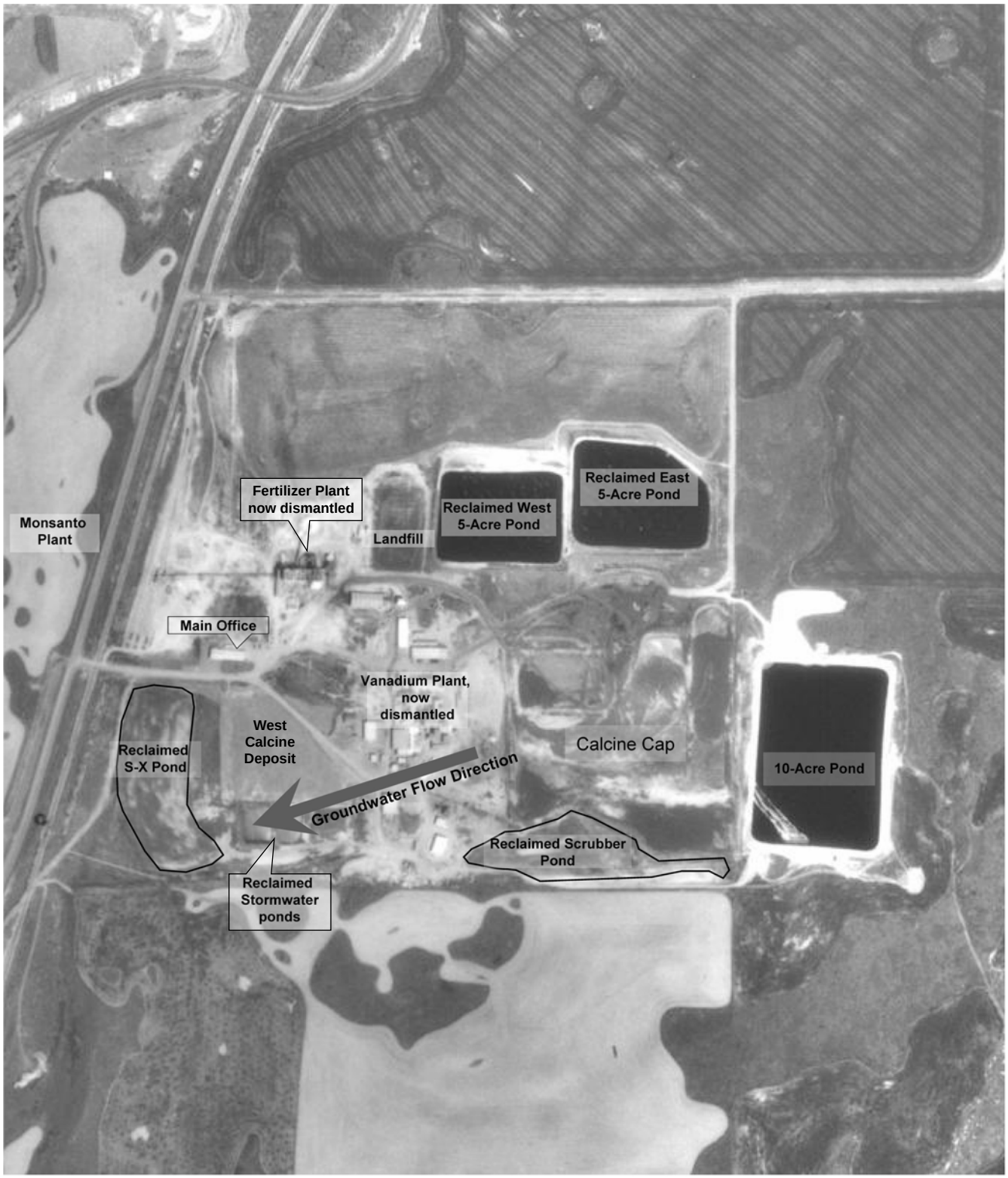
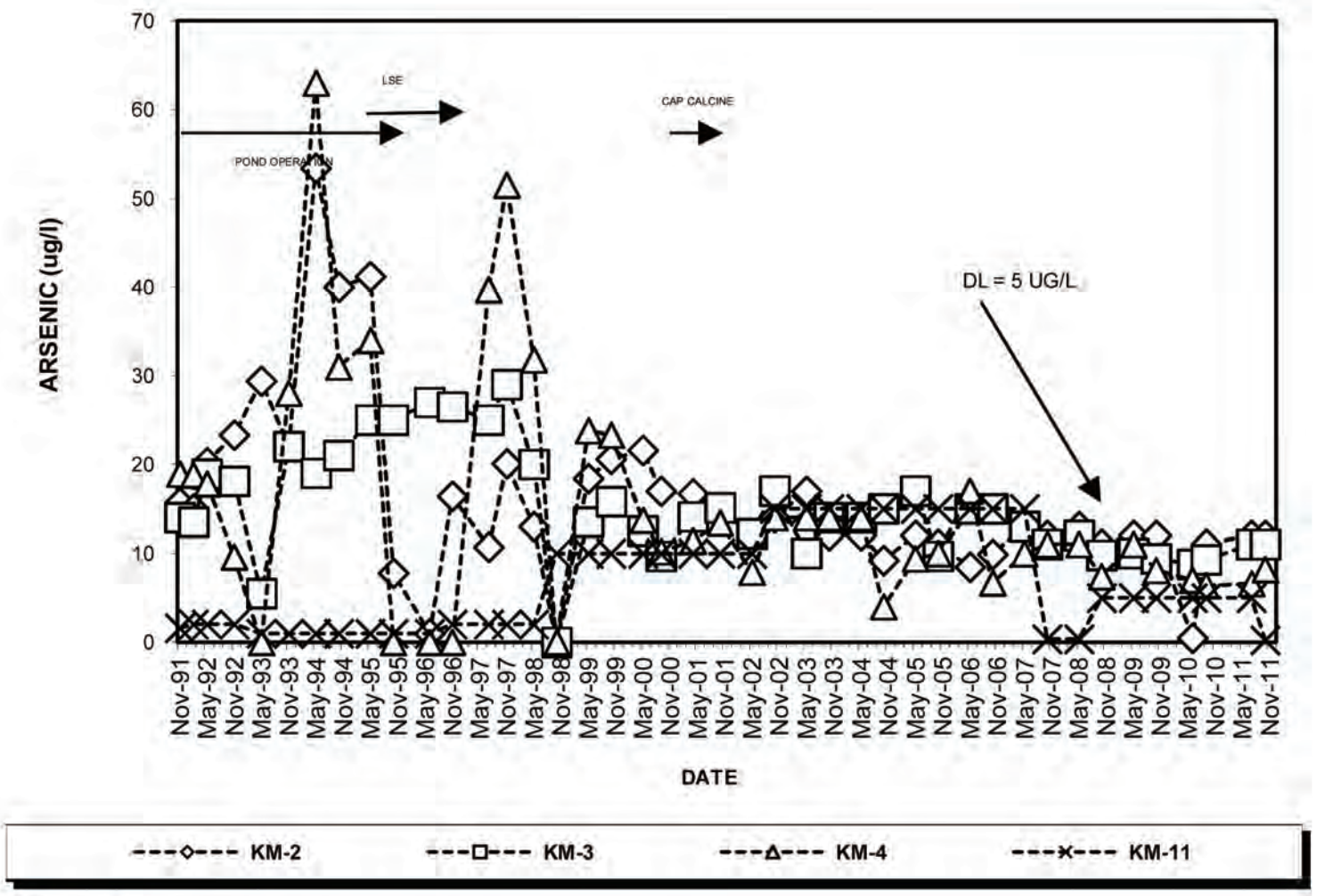


Photo: September 2000.

Source: USEPA, Second Five-Year Review Report for Kerr-McGee Chemical Corp. (Soda Springs) Superfund Site, September 2007.

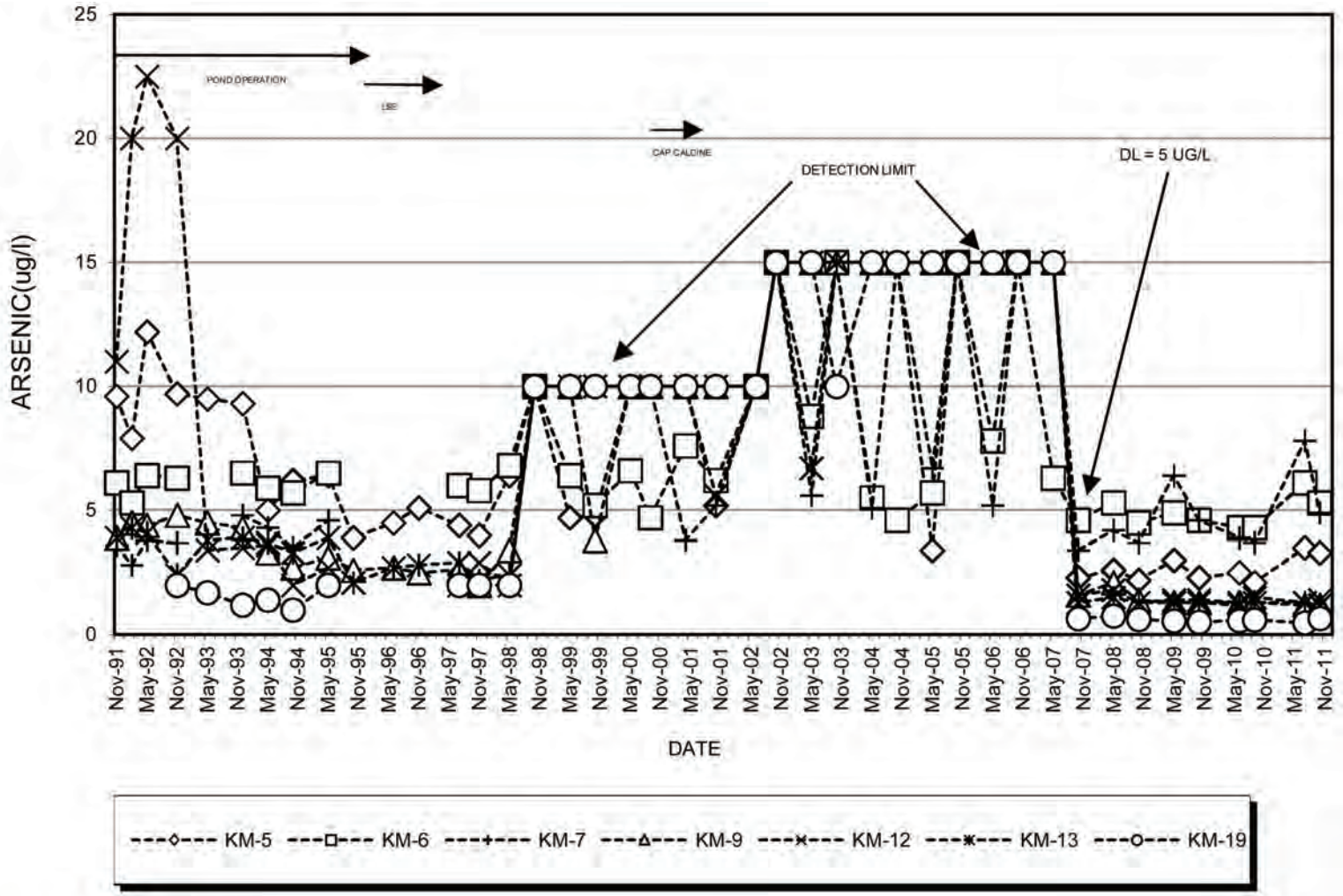
FIGURE 2
Site Map - Tronox Facility Features
Kerr-McGee 2012 Five Year Review



RBC FOR ARSENIC IS 10 ug/l
KM-2, KM-3, KM-11 ARE POC WELLS
VALUES LESS THAN DETECTION ARE PLOTTED AT DETECTION LIMIT
ARSENIC DETECTION LIMIT AT 10 to 15 UG/L 1999 THROUGH 2007

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

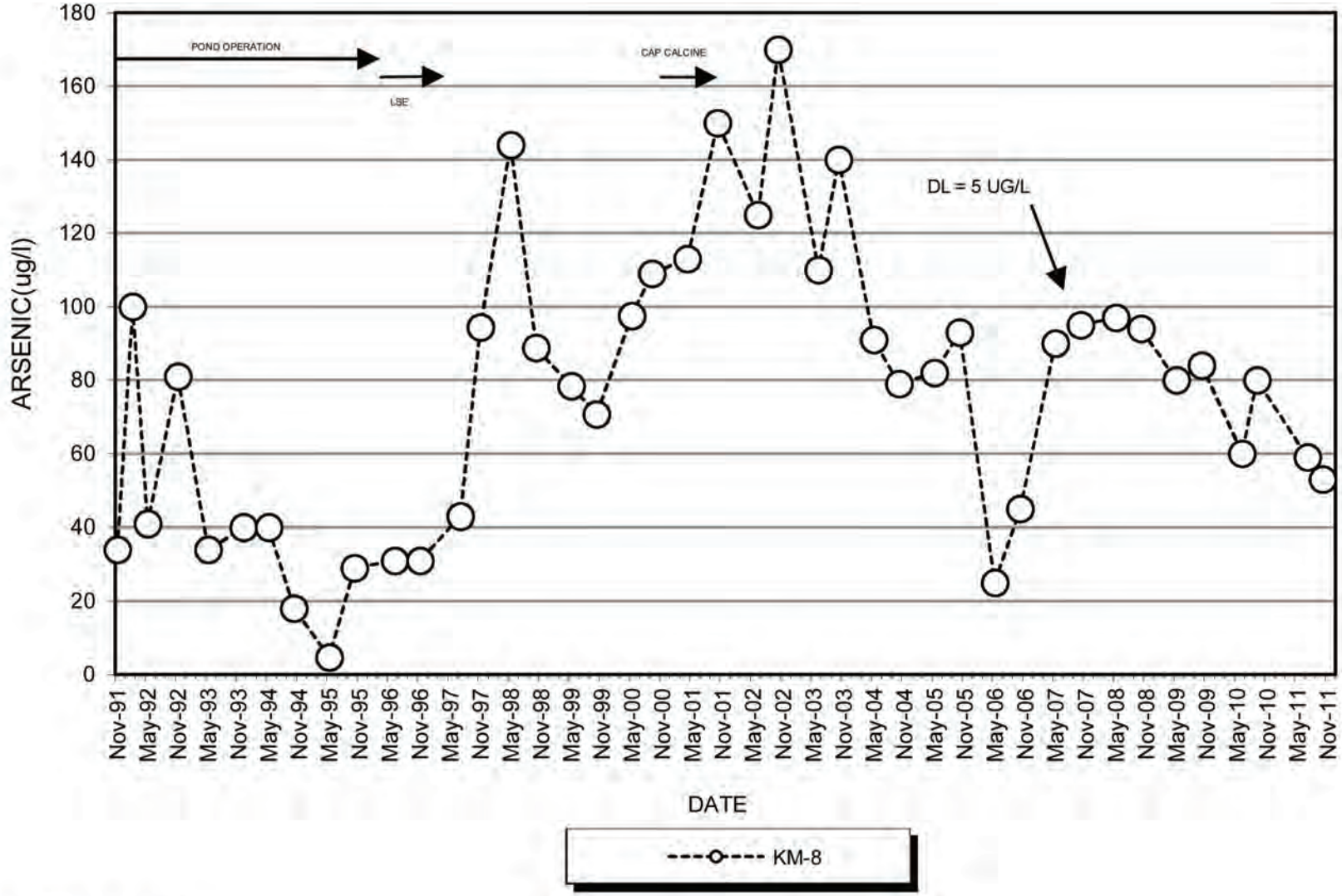
FIGURE 3
Arsenic vs. Time
Wells Near Former Scrubber Pond
Kerr-McGee 2012 Five Year Review



RBC FOR ARSENIC IS 10 ug/l
KM-5, KM-9, KM-12, KM-13, KM-19 ARE POC WELLS
VALUES LESS THAN DETECTION ARE PLOTTED AT THE DETECTION LIMIT
ARSENIC IS LESS THAN DETECTION OR REPORTING LIMIT IN ALL WELLS DURING 2003 through May 2007

FIGURE 4
Arsenic vs. Time
Wells Near West Side of Facility or Near Former S-X Pond
Kerr-McGee 2012 Five Year Review

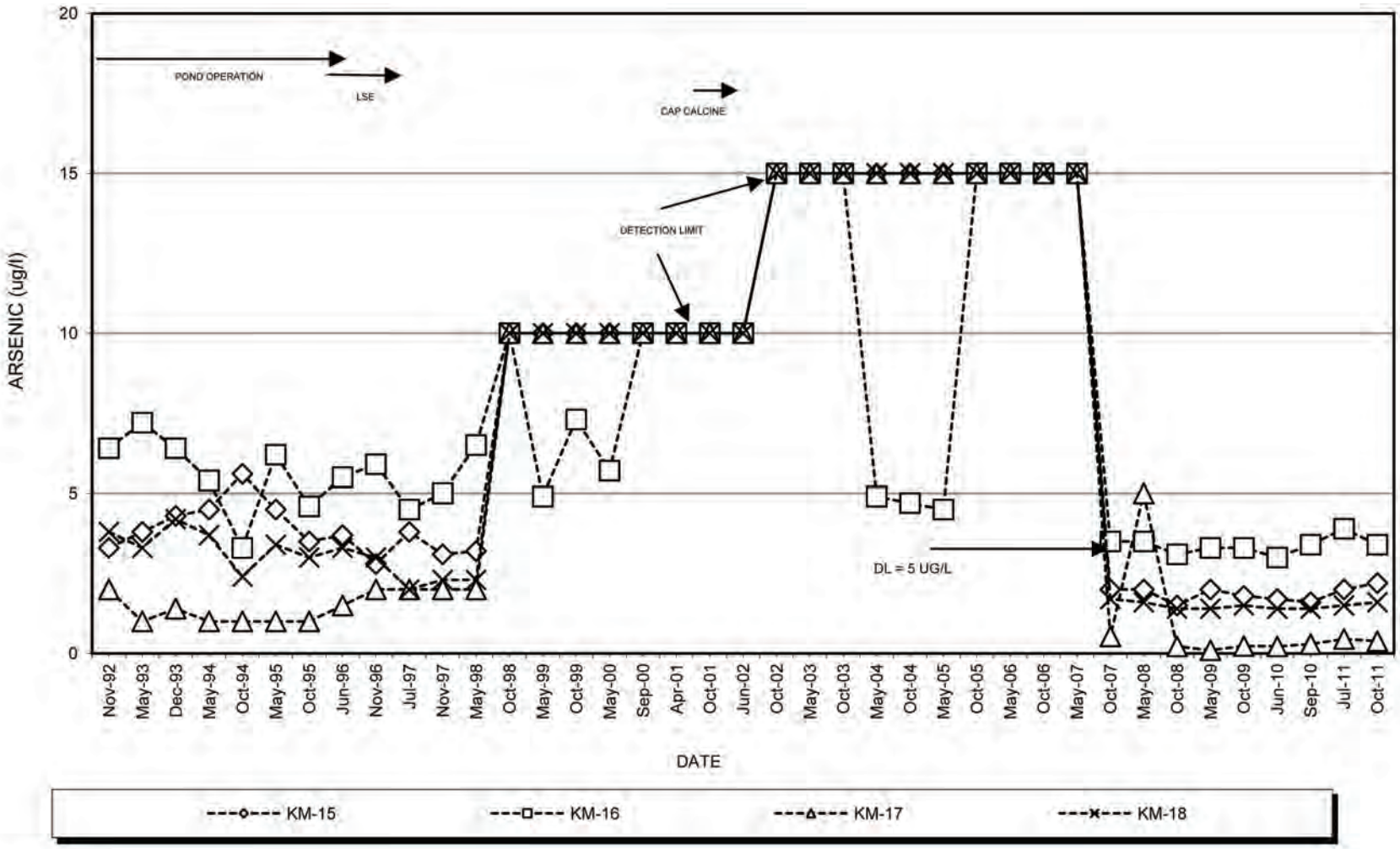
Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.



RBC FOR ARSENIC IS 10 ug/l
KM-8 IS A POC WELL
VALUES LESS THAN DETECTION ARE PLOTTED AT THE DETECTION LIMIT

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

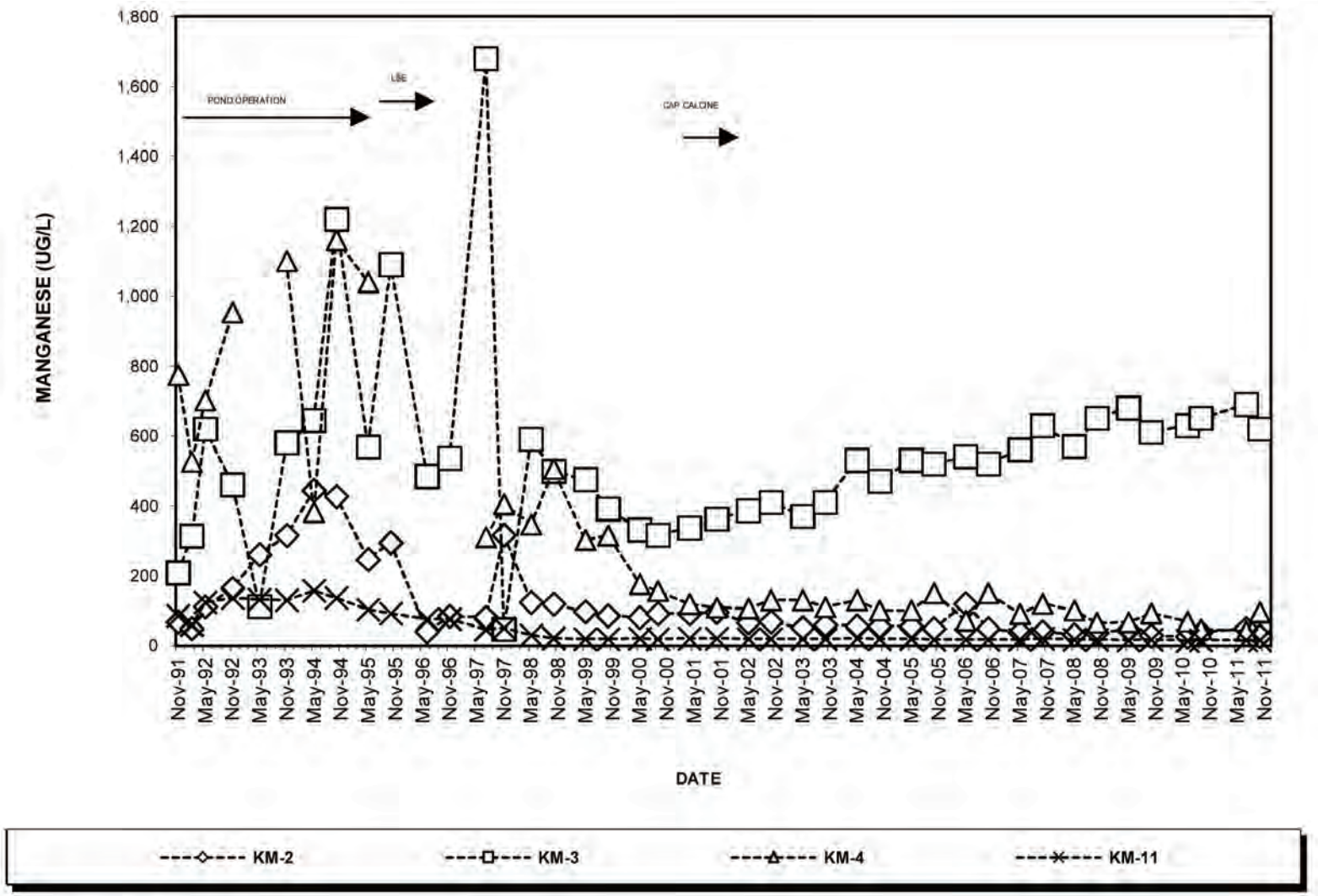
FIGURE 5
Arsenic vs. Time
Well KM-8 Near Former S-X Pond
Kerr-McGee 2012 Five Year Review



RBC = 10 ug/l
Values less than detection plotted at the detection limit

FIGURE 6
Arsenic vs. Time
Offsite Wells
Kerr-McGee 2012 Five Year Review

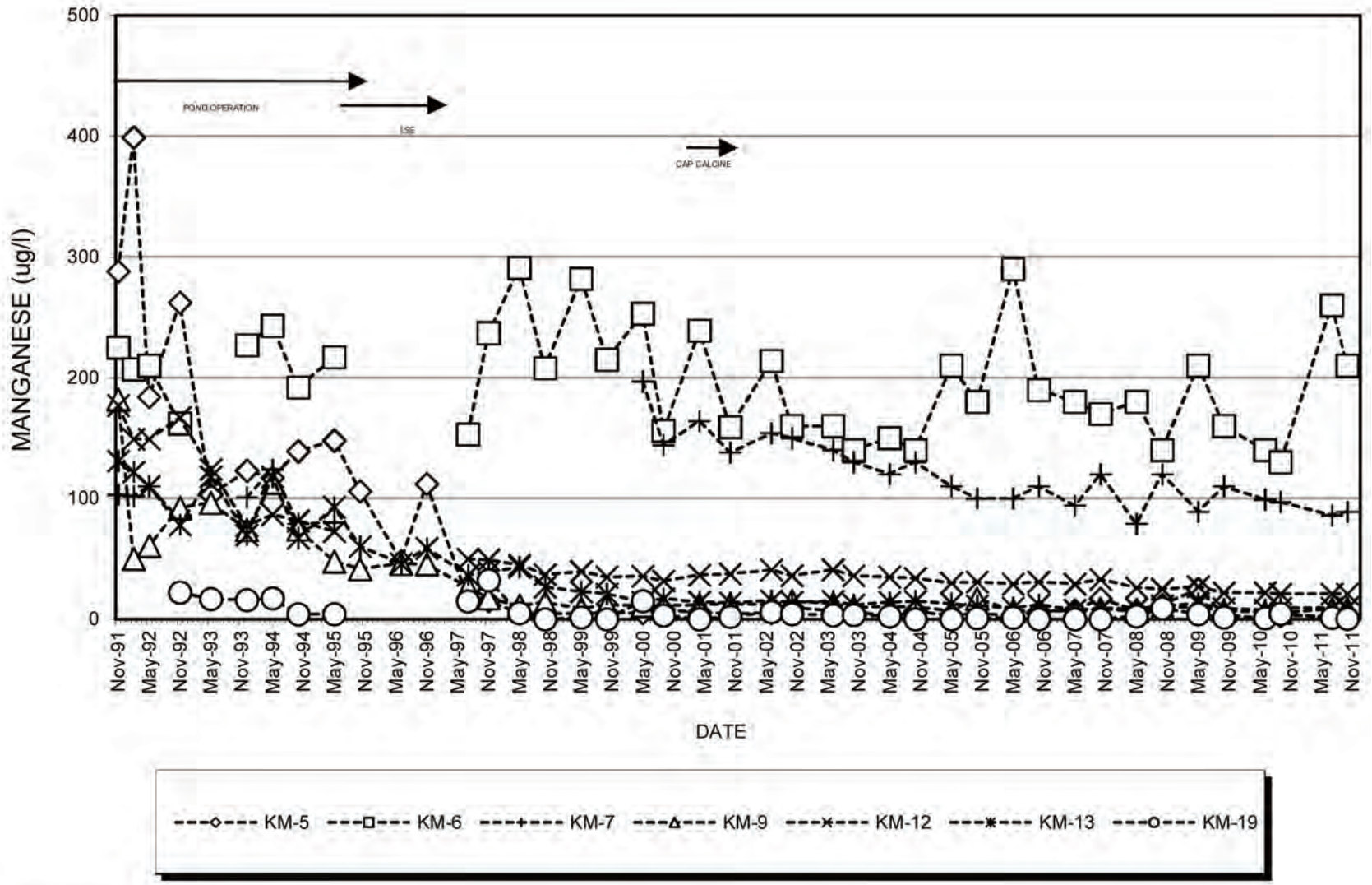
Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.



RBC FOR MANGANESE IS 180 ug/l
KM-2, KM-3, KM-11 ARE POC WELLS
VALUES LESS THAN DETECTION ARE PLOTTED AT DETECTION LIMIT

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

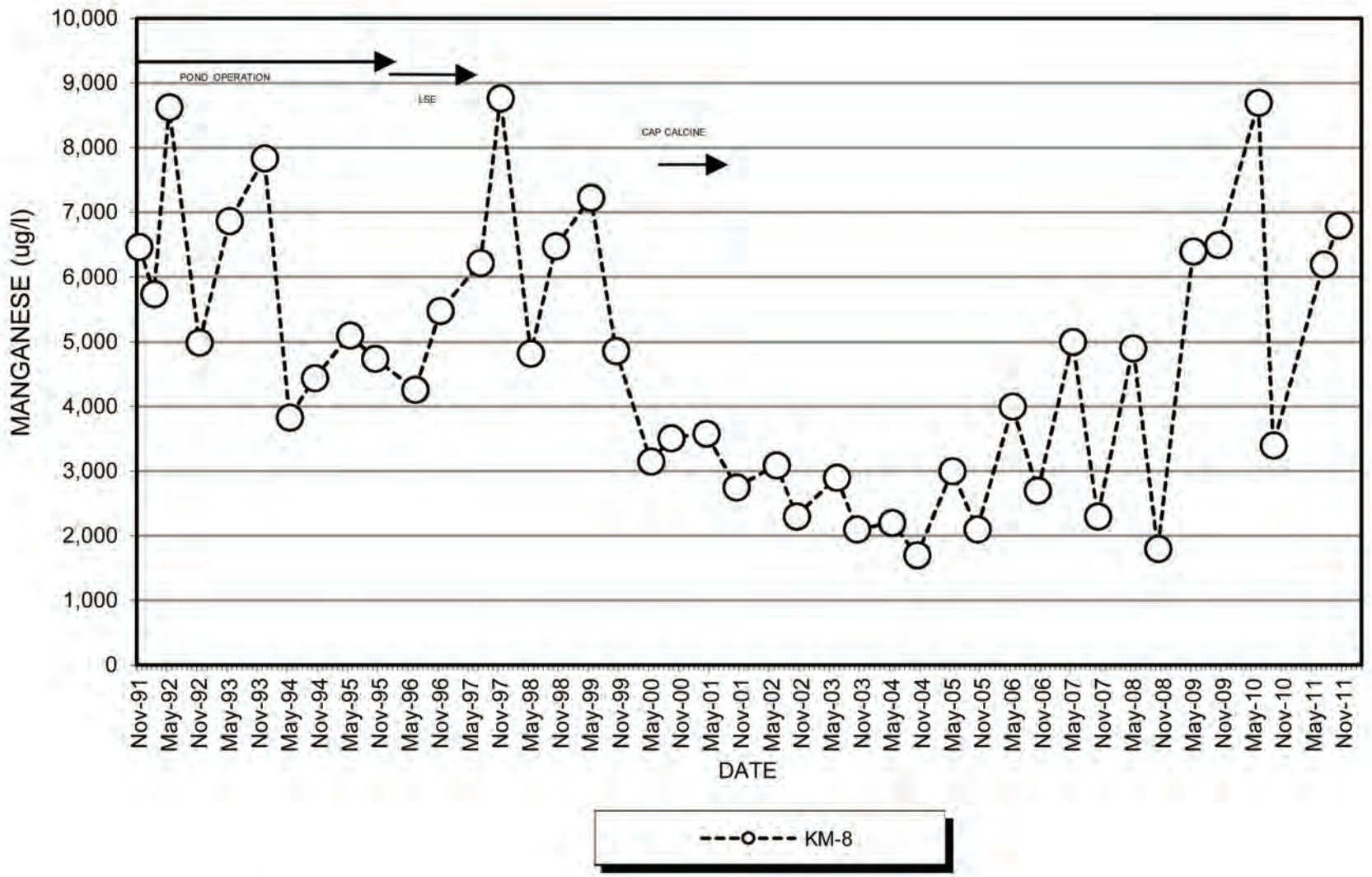
FIGURE 7
Manganese vs. Time
Wells Near Former Scrubber Pond
Kerr-McGee 2012 Five Year Review



RBC FOR MANGANESE IS 180 ug/l
KM-5, KM-9, KM-12, KM-13, KM-19 ARE POC WELLS

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

FIGURE 8
Manganese vs. Time
Wells Near West Side of Facility or Near Former S-X Pond
Kerr-McGee 2012 Five Year Review



RBC FOR MANGANESE IS 180 ug/l
KM-8 IS A POC WELL

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

FIGURE 9
Manganese vs. Time
Well KM-8 Near Former S-X Pond
Kerr-McGee 2012 Five Year Review

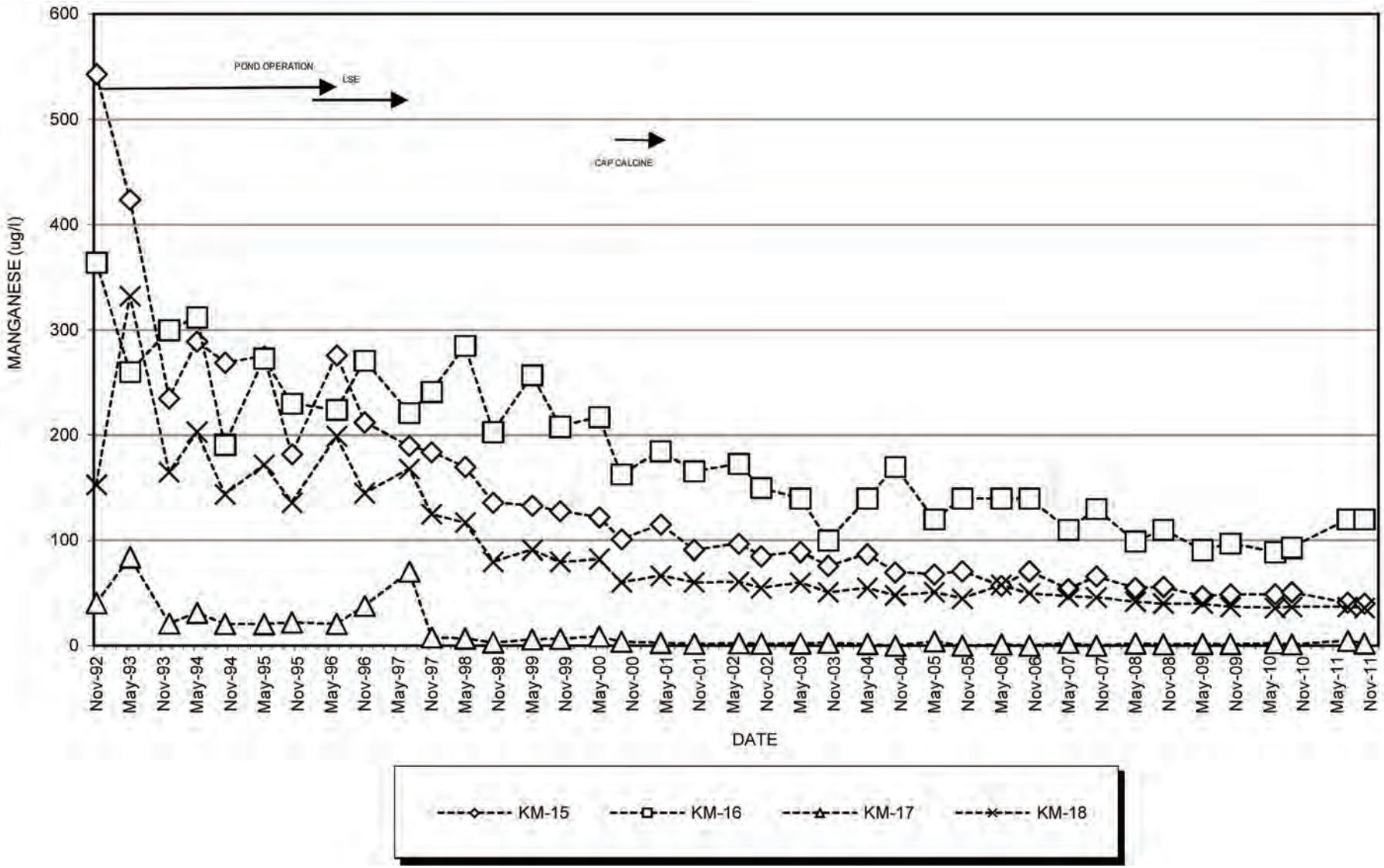
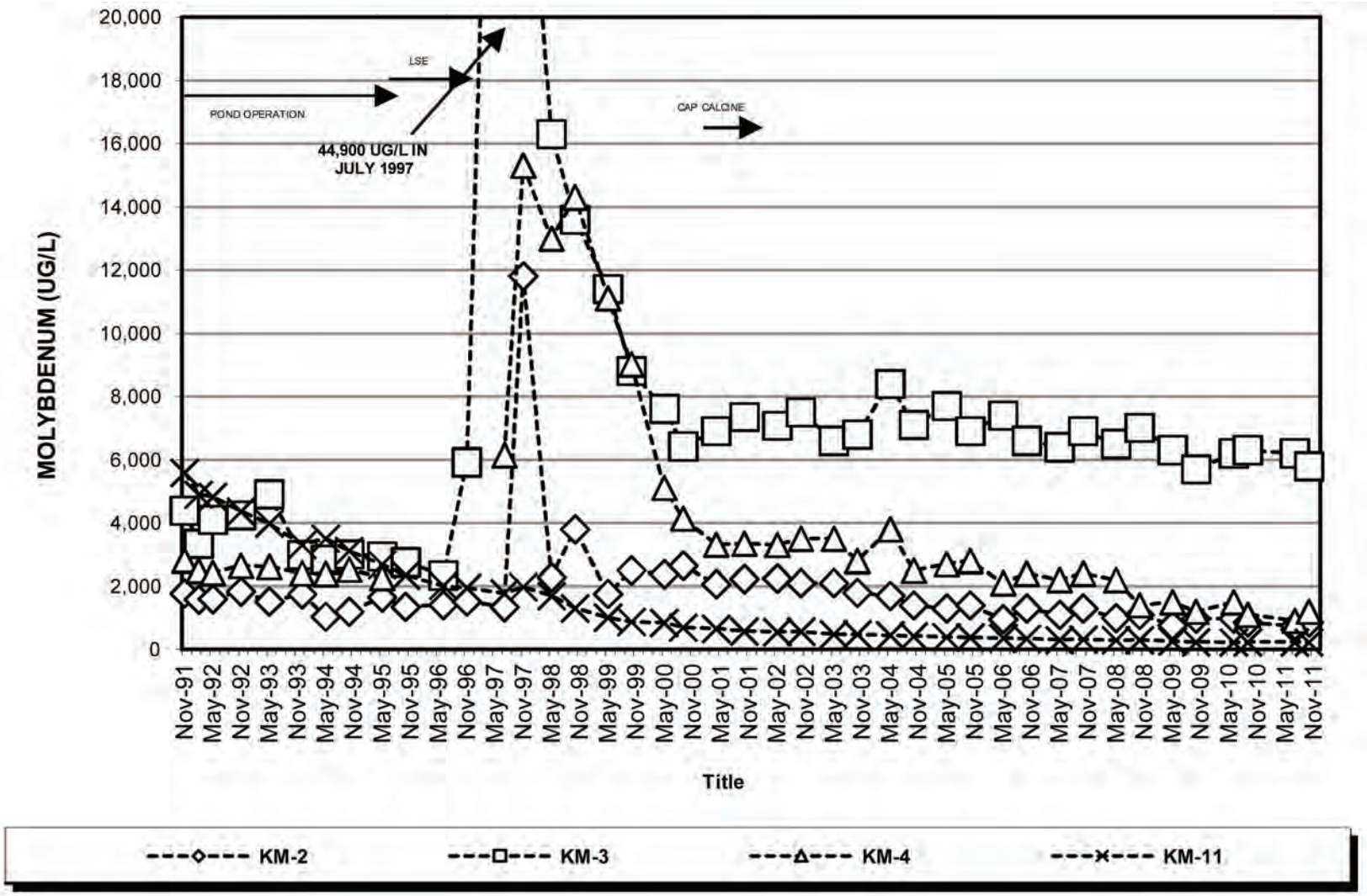


FIGURE 10
Manganese vs. Time
Offsite Wells
Kerr-McGee 2012 Five Year Review

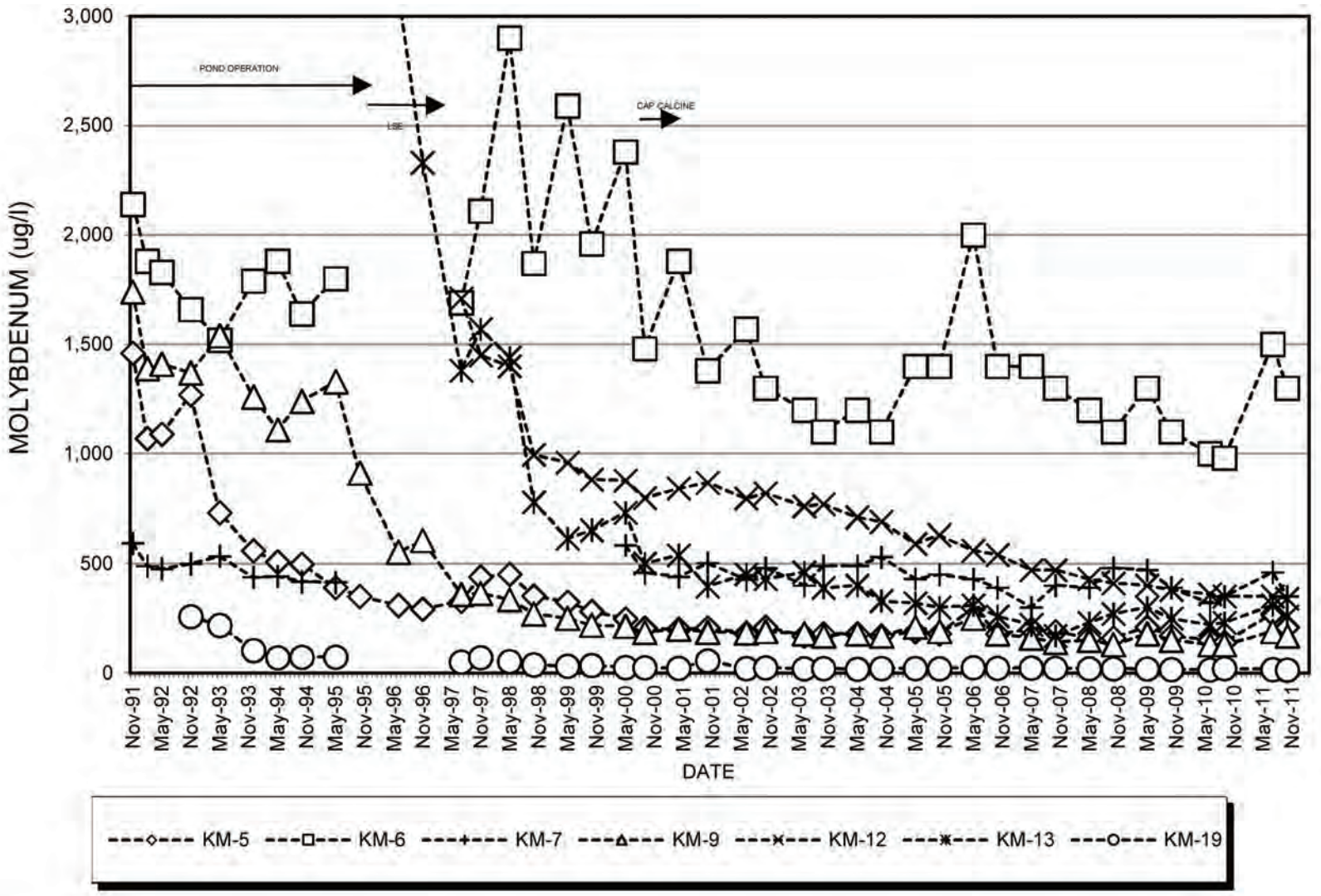
Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.



RBC FOR Molybdenum IS 180 ug/l
KM-2, KM-3, KM-11 ARE POC WELLS

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

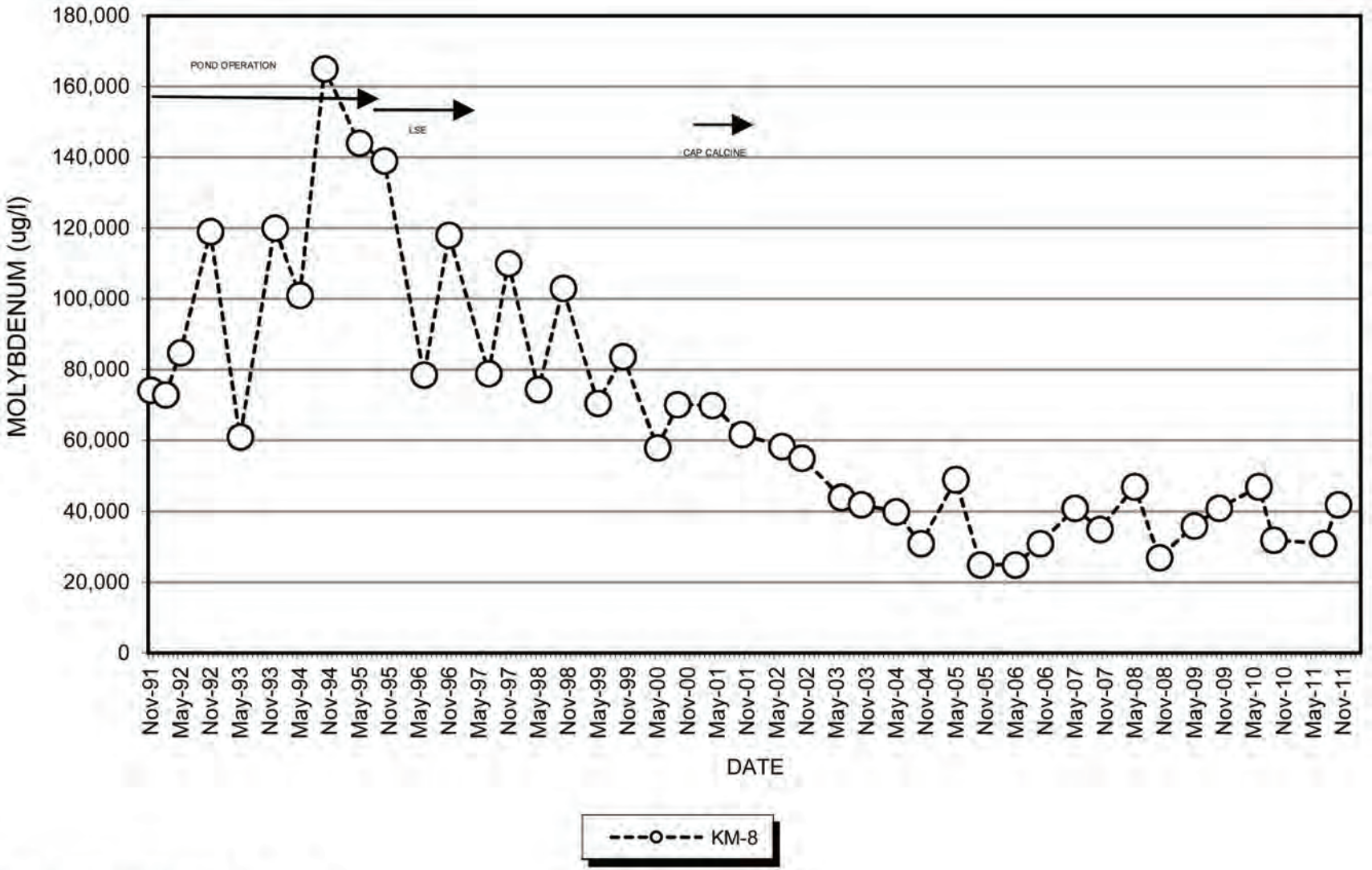
FIGURE 11
Molybdenum vs. Time
Wells Near Former Scrubber Pond
Kerr-McGee 2012 Five Year Review



RBC FOR MOLYBDENUM IS 180 ug/l
KM-5, KM-9, KM-12, KM-13, KM-19 ARE POC WELLS

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

FIGURE 12
Molybdenum vs. Time
Wells Near West Side of Facility or Near Former S-X Pond
Kerr-McGee 2012 Five Year Review



RBC FOR MOLYBDENUM IS 180 ug/l
KM-8 IS A POC WELL

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

FIGURE 13
Molybdenum vs. Time
Well KM-8 Near Former S-X Pond
Kerr-McGee 2012 Five Year Review

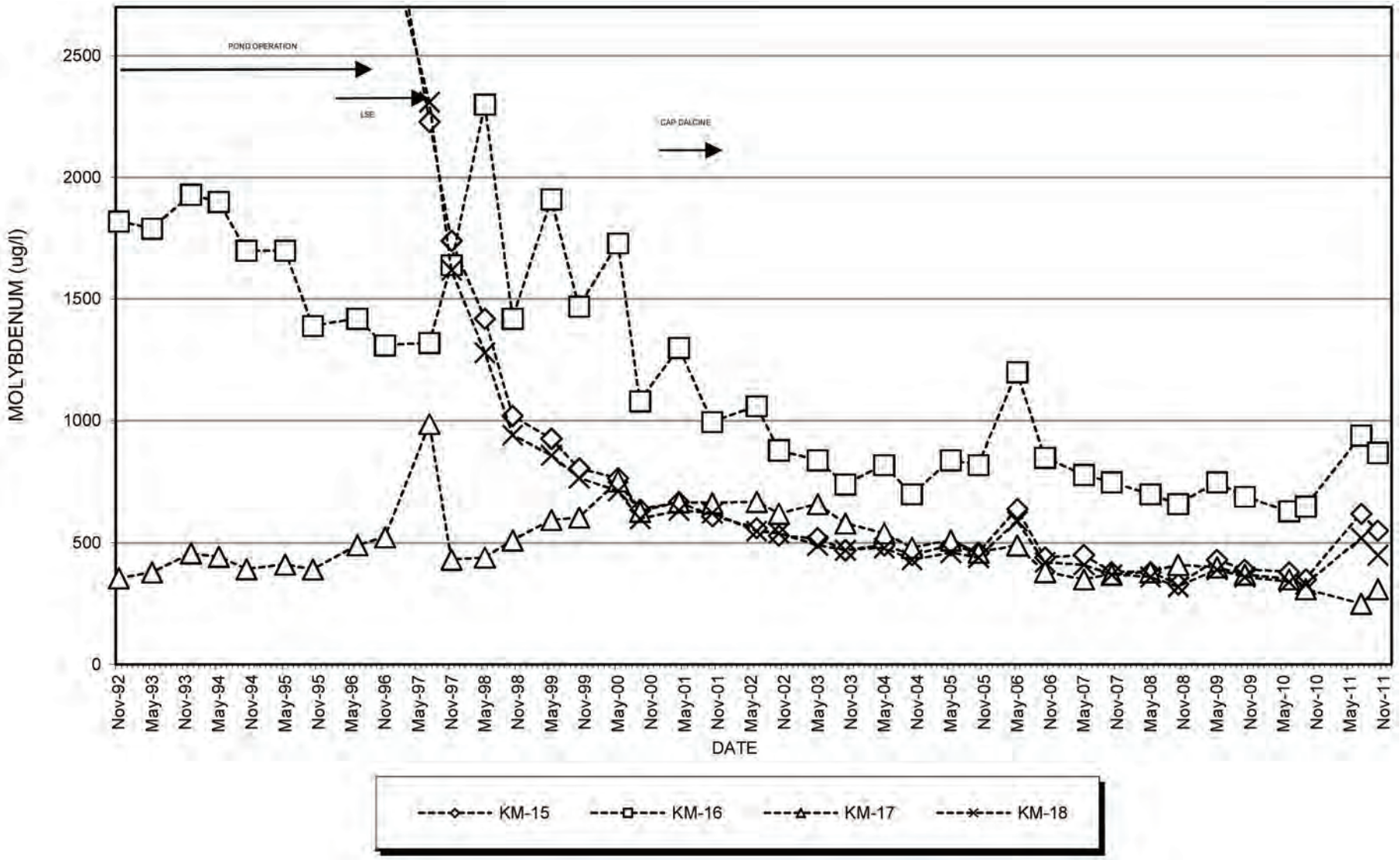
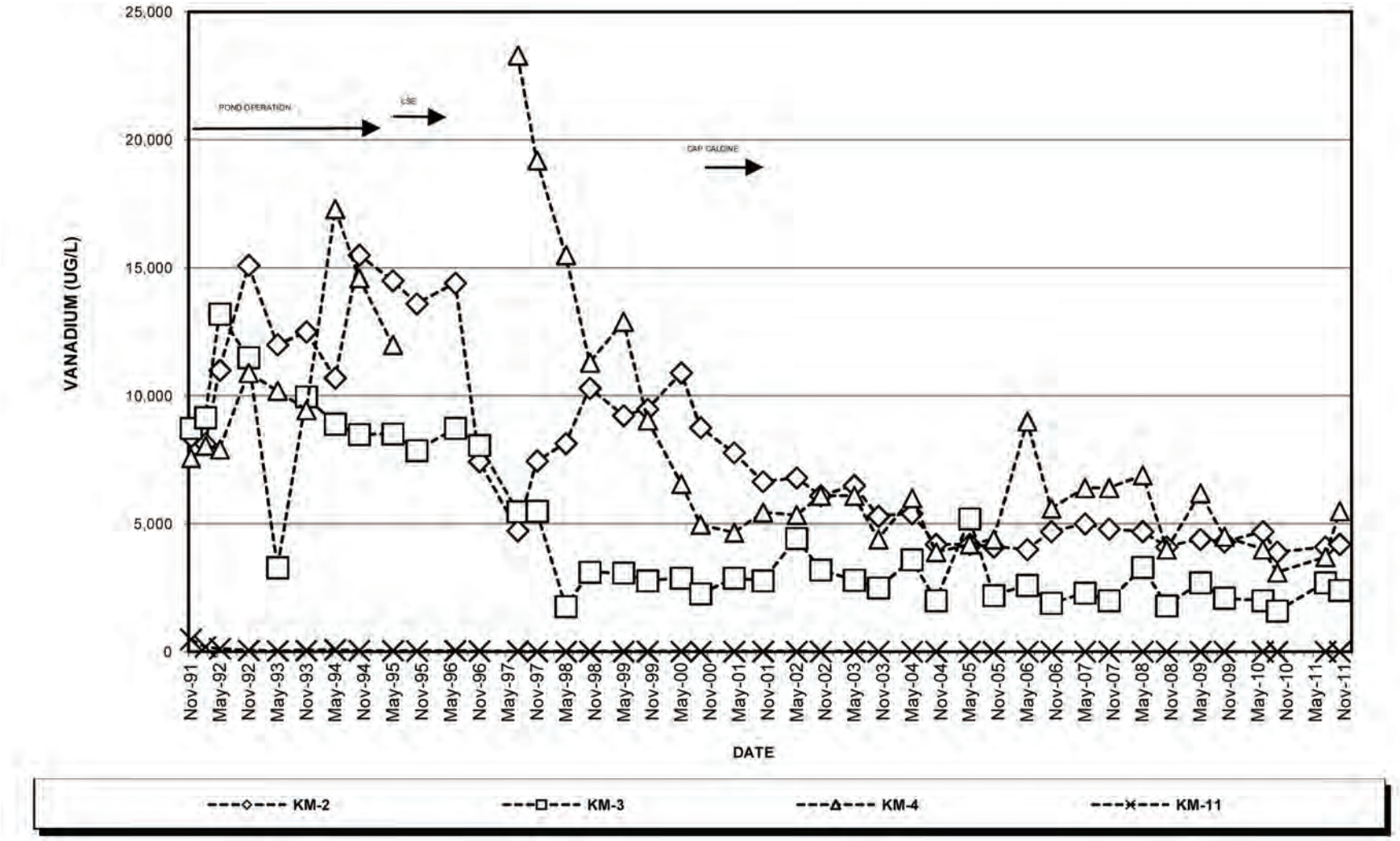


FIGURE 14
Molybdenum vs. Time
Offsite Wells
Kerr-McGee 2012 Five Year Review

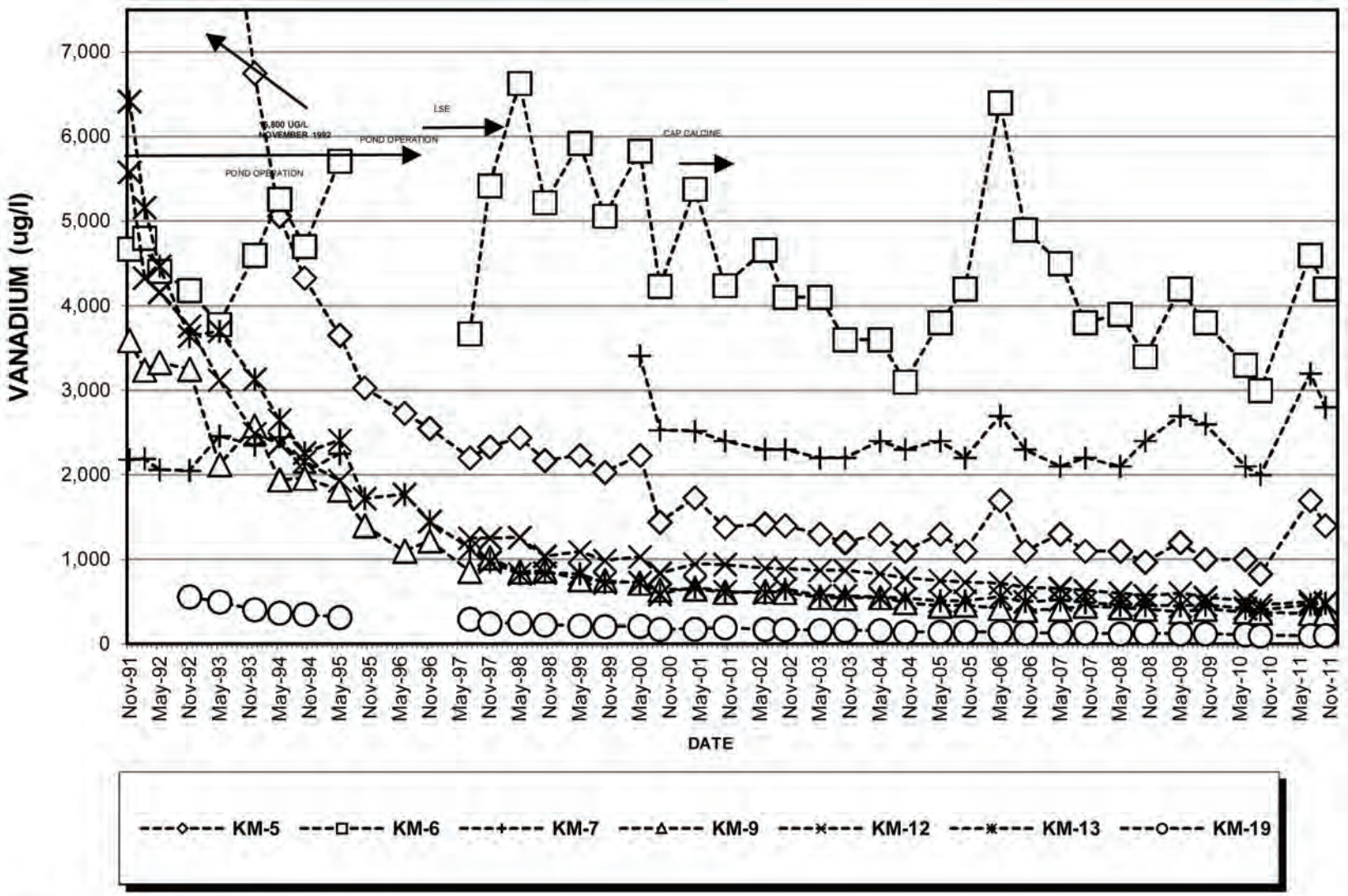
Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.



RBC FOR VANADIUM IS 260 ug/l
KM-2, KM-3, KM-11 ARE POC WELLS
VALUES LESS THAN DETECTION ARE PLOTTED AT DETECTION LIMIT

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

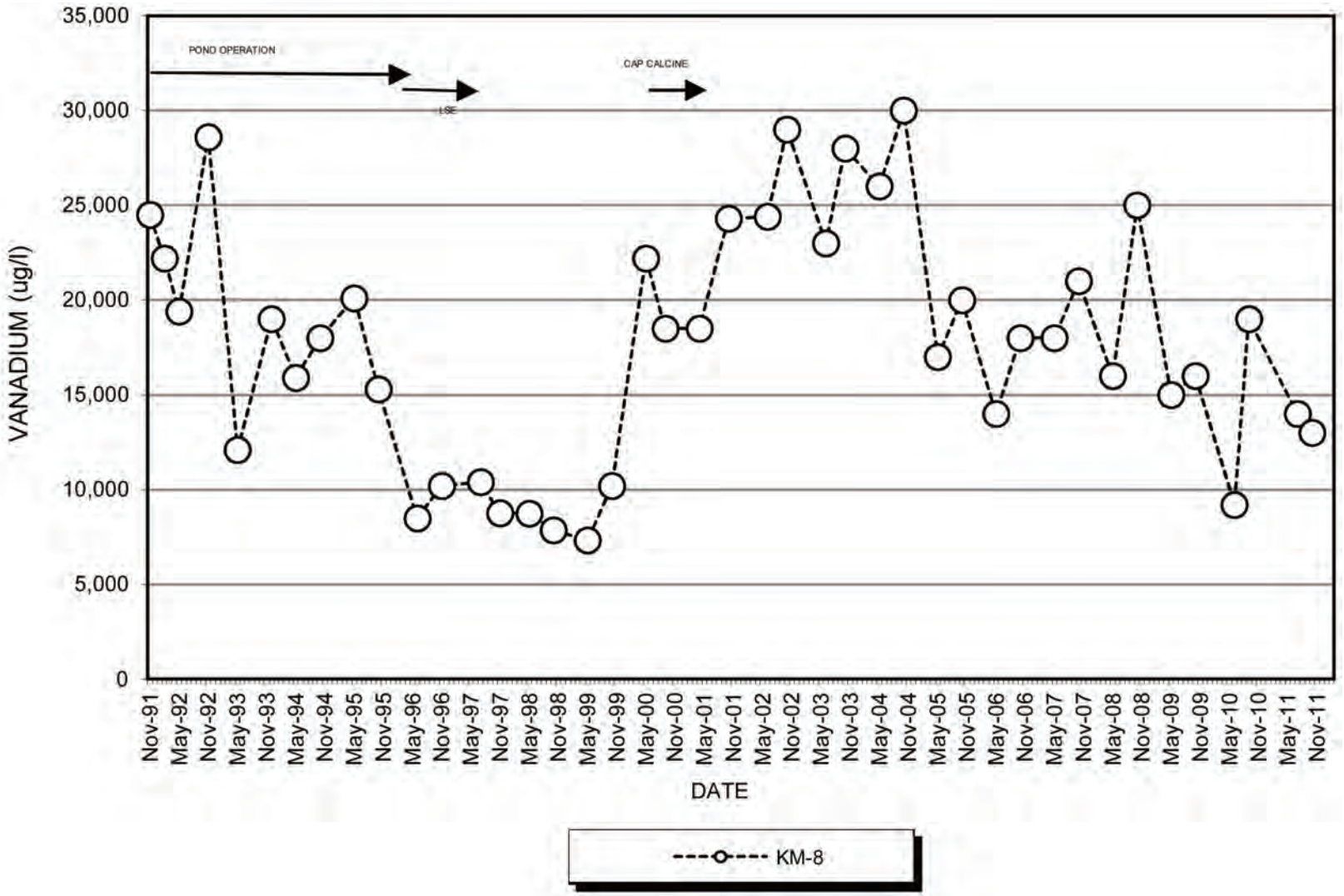
FIGURE 15
Vanadium vs. Time
Wells Near Former Scrubber Pond
Kerr-McGee 2012 Five Year Review



RBC FOR VANADIUM IS 260 ug/l
KM-2, KM-3, KM-11 ARE POC WELLS
VALUES LESS THAN DETECTION ARE PLOTTED AT DETECTION LIMIT

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

FIGURE 16
Vanadium vs. Time
Wells Near West Site of Facility or Near Former S-X Pond
Kerr-McGee 2012 Five Year Review



RBC FOR VANADIUM IS 260 ug/l
KM-8 IS A POC WELLS

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

FIGURE 17
Vanadium vs. Time
Well KM-8 Near Former S-X Pond
Kerr-McGee 2012 Five Year Review

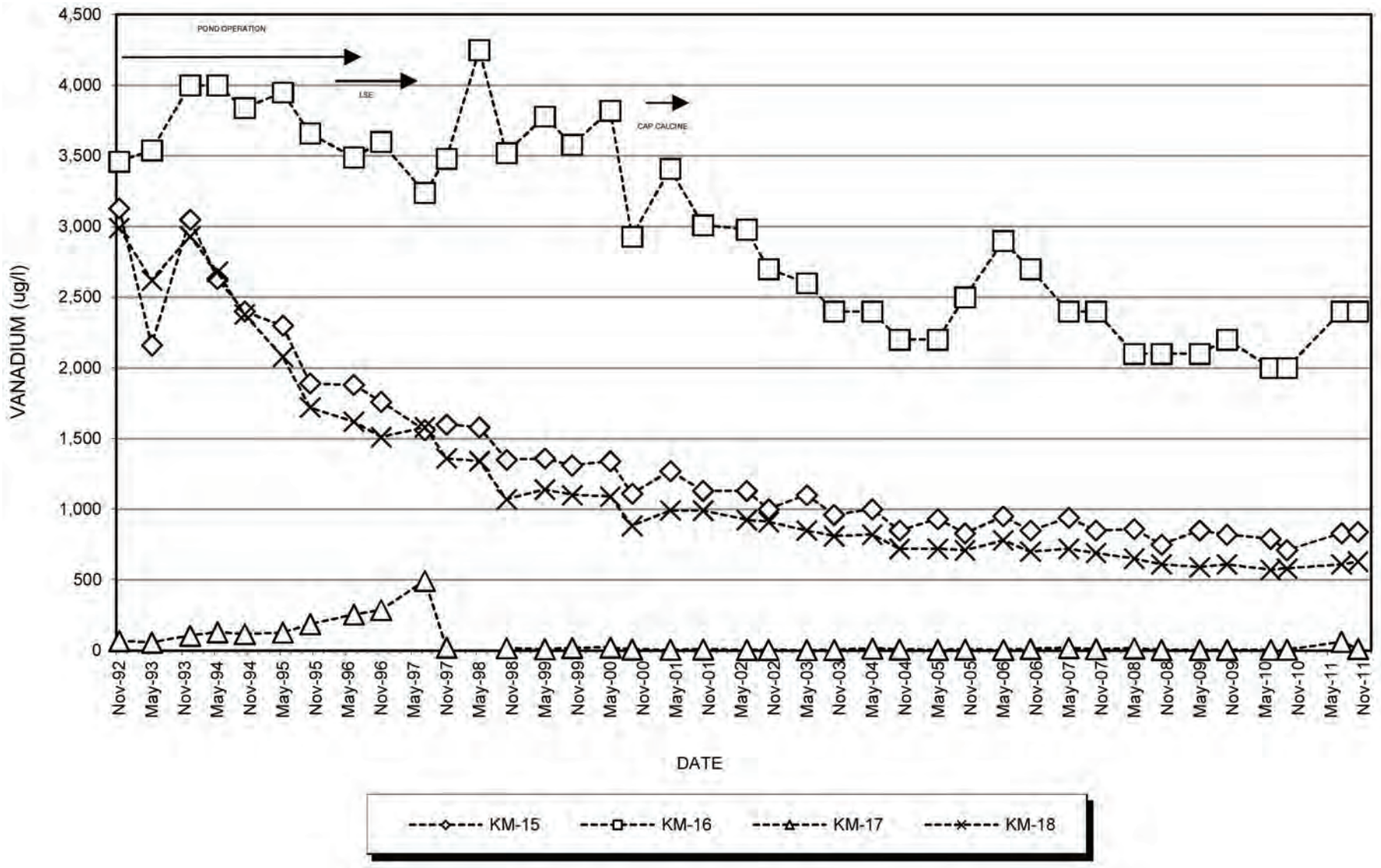
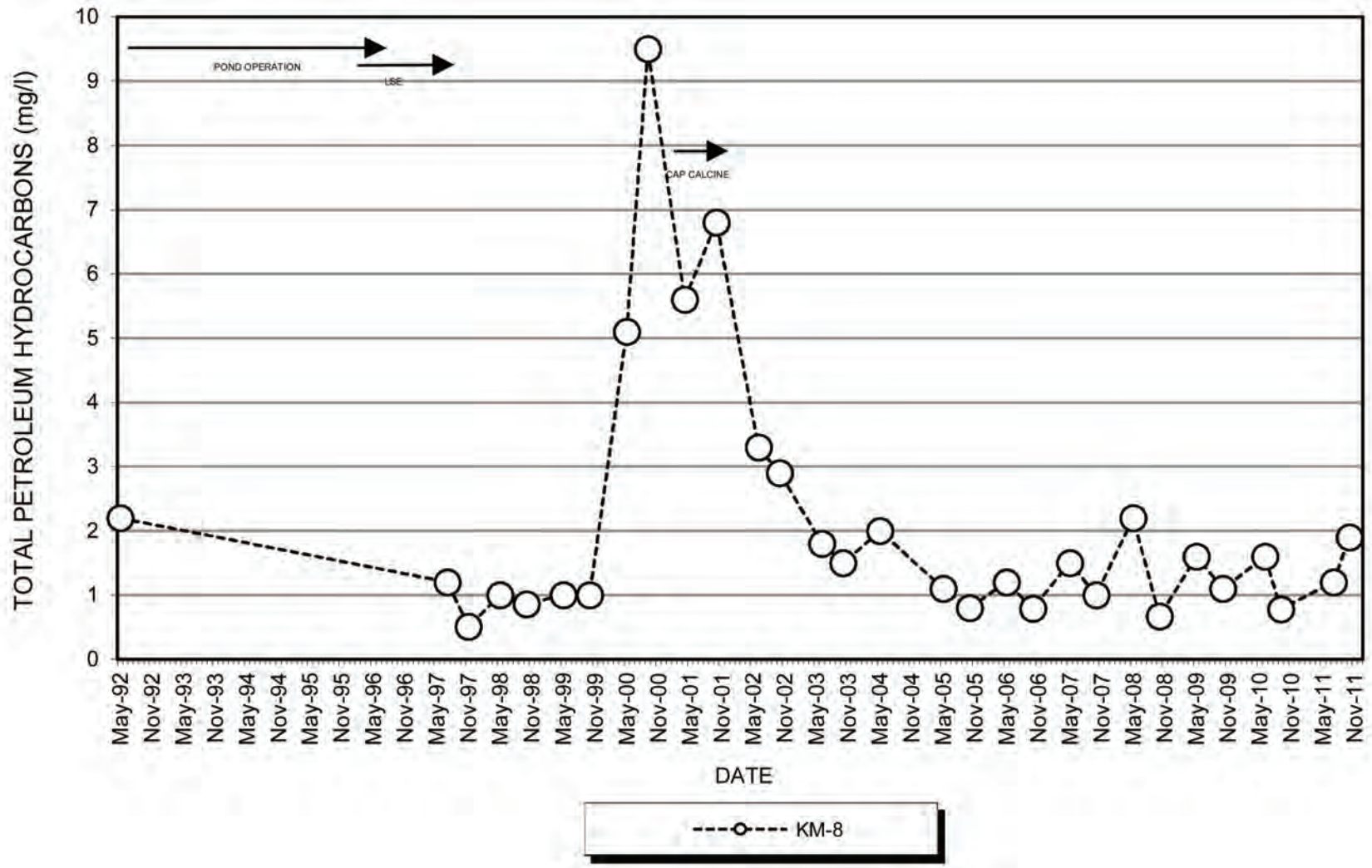


FIGURE 18
Vanadium vs. Time
Offsite Wells
Kerr-McGee 2012 Five Year Review

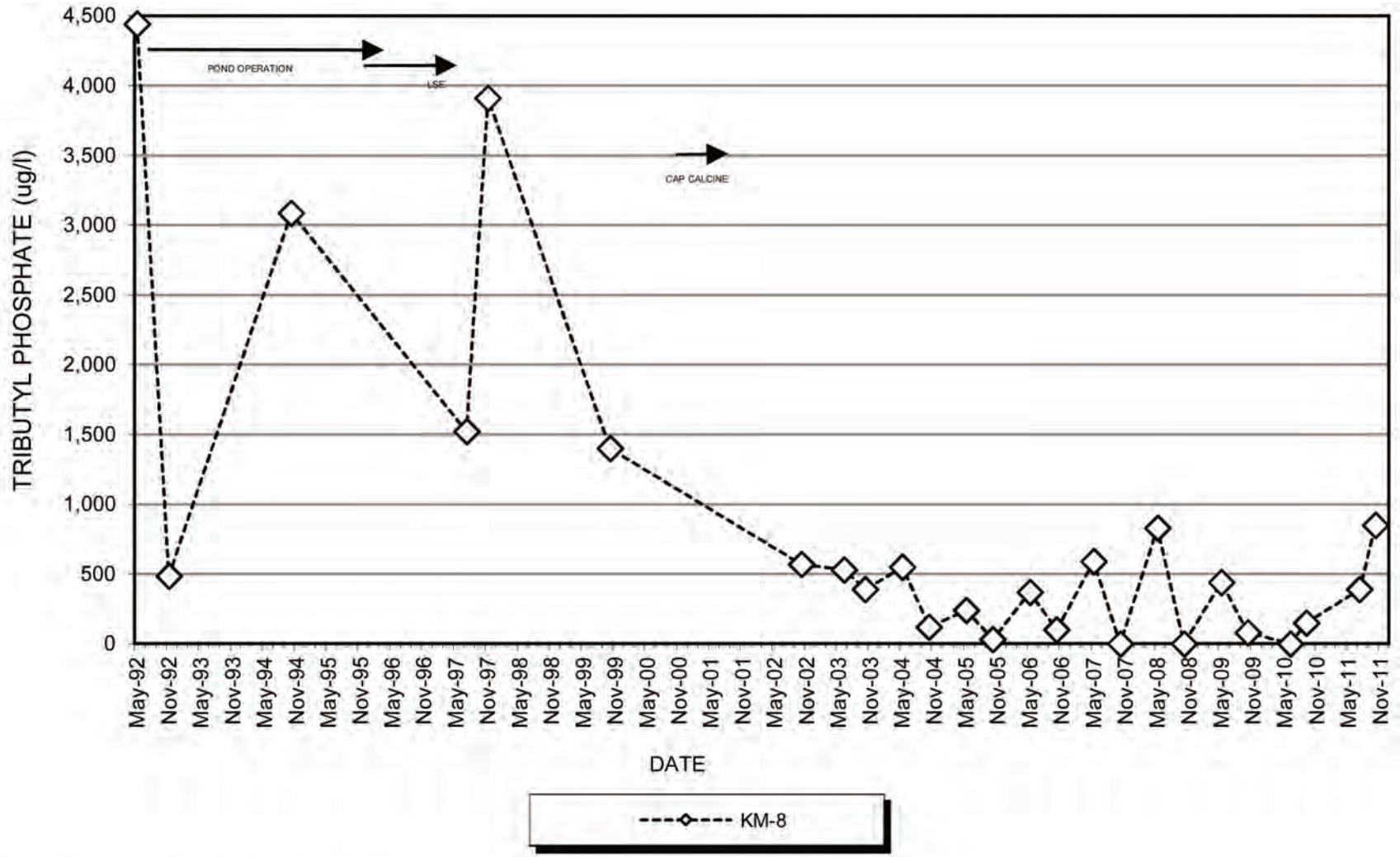
Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.



RBC FOR TPH IS 0.73 mg/l
KM-8 IS A POC WELL
1999 VALUES LESS THAN DETECTION

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

FIGURE 19
Total Petroleum Hydrocarbons vs. Time
Well KM-8 Near Former S-X Pond
Kerr-McGee 2012 Five Year Review



RBC FOR TRIBUTYL PHOSPHATE IS 180 ug/l
KM-8 IS A POC WELL
VALUES ESTIMATED AS DETECTED

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

FIGURE 20
Tributyl Phosphate vs. Time
Well KM-8 Near Former S-X Pond
Kerr-McGee 2012 Five Year Review

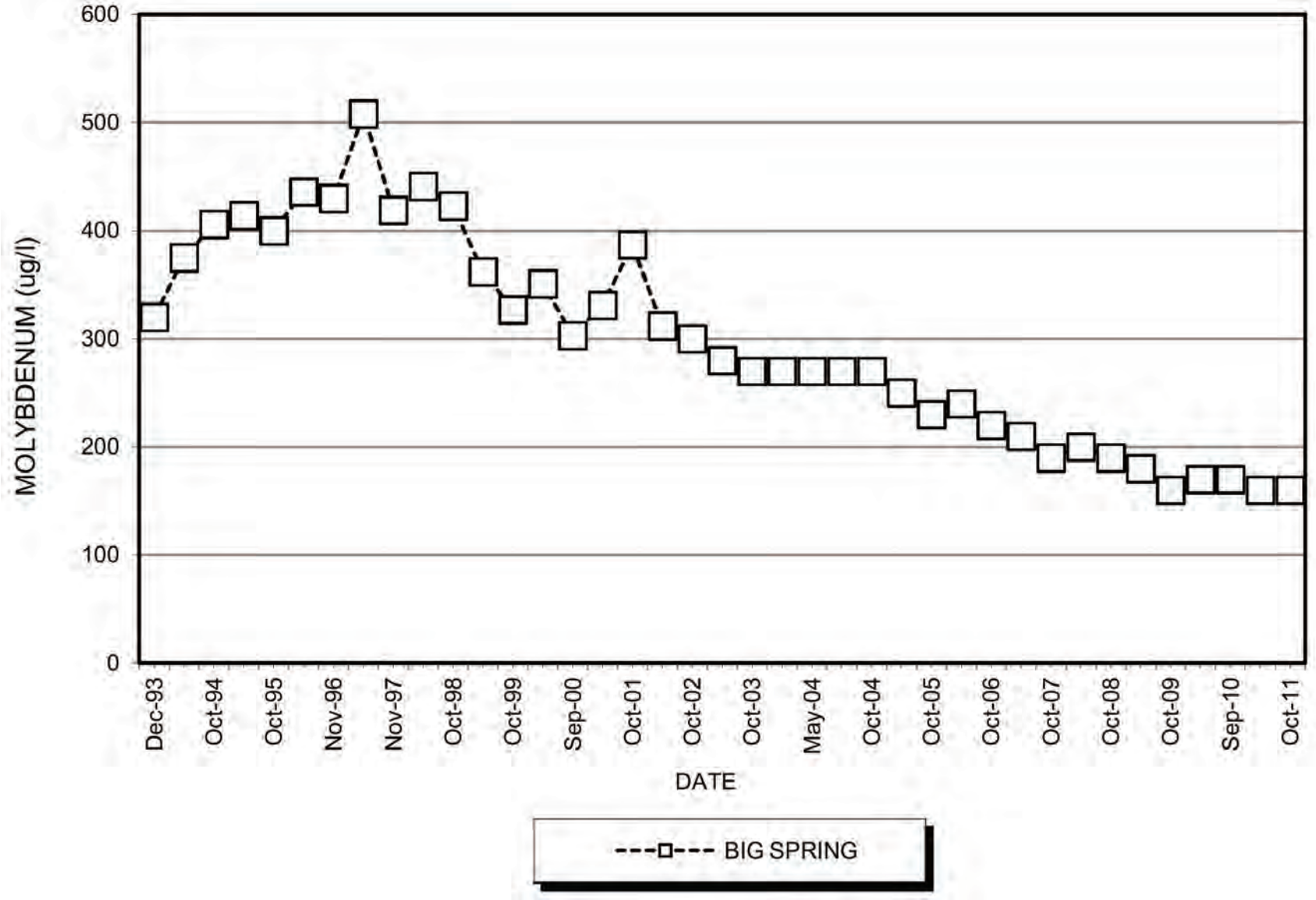


FIGURE 21
Molybdenum vs. Time
Big Spring
Kerr-McGee 2012 Five Year Review

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

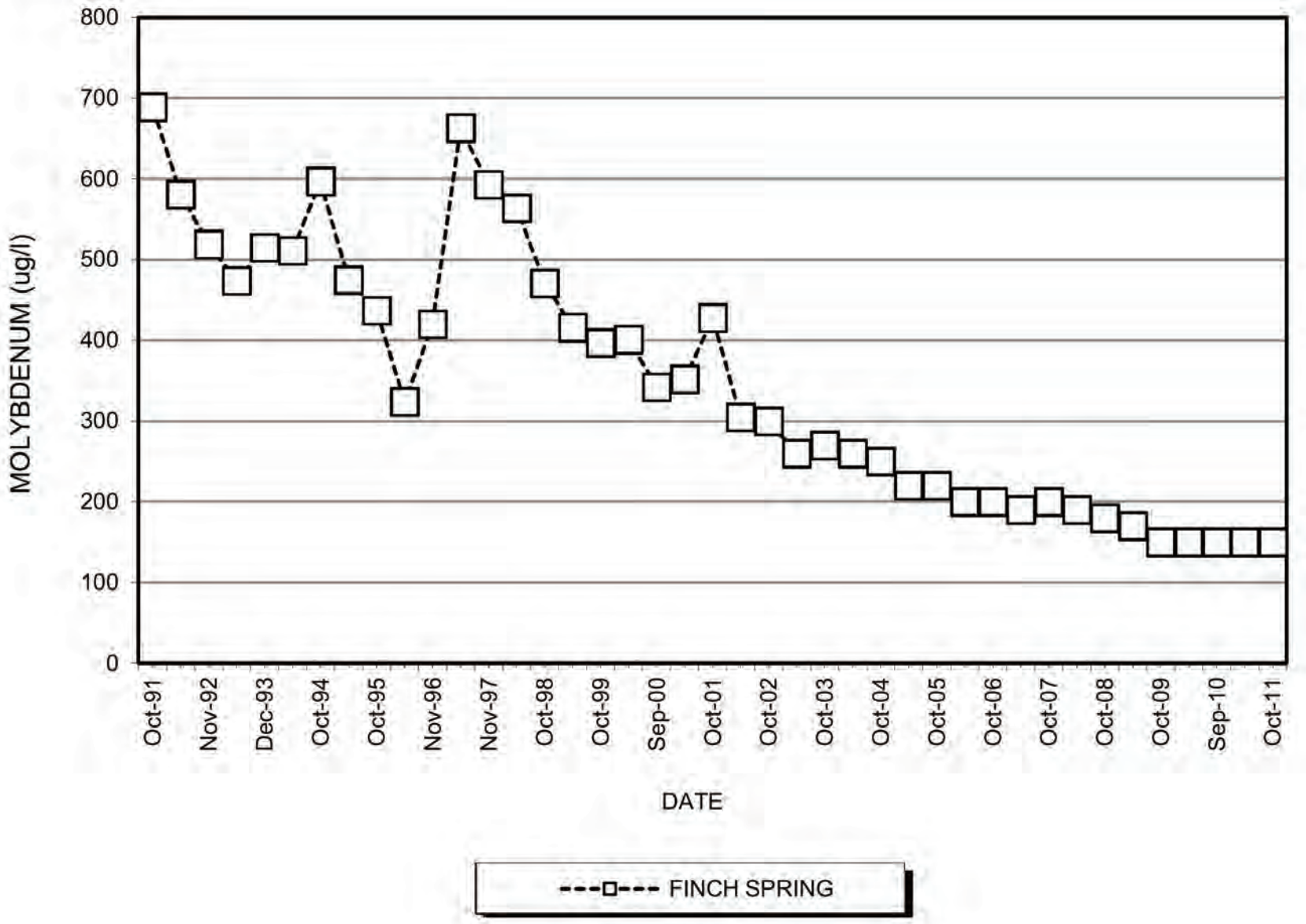


FIGURE 22
Molybdenum vs. Time
Finch Spring
Kerr-McGee 2012 Five Year Review

Source: 2012 Annual Comprehensive Report of Ground and Surface Water Quality, Greenfield Environmental Multistate Trust, Former Tronox Soda Springs, Idaho Facility.

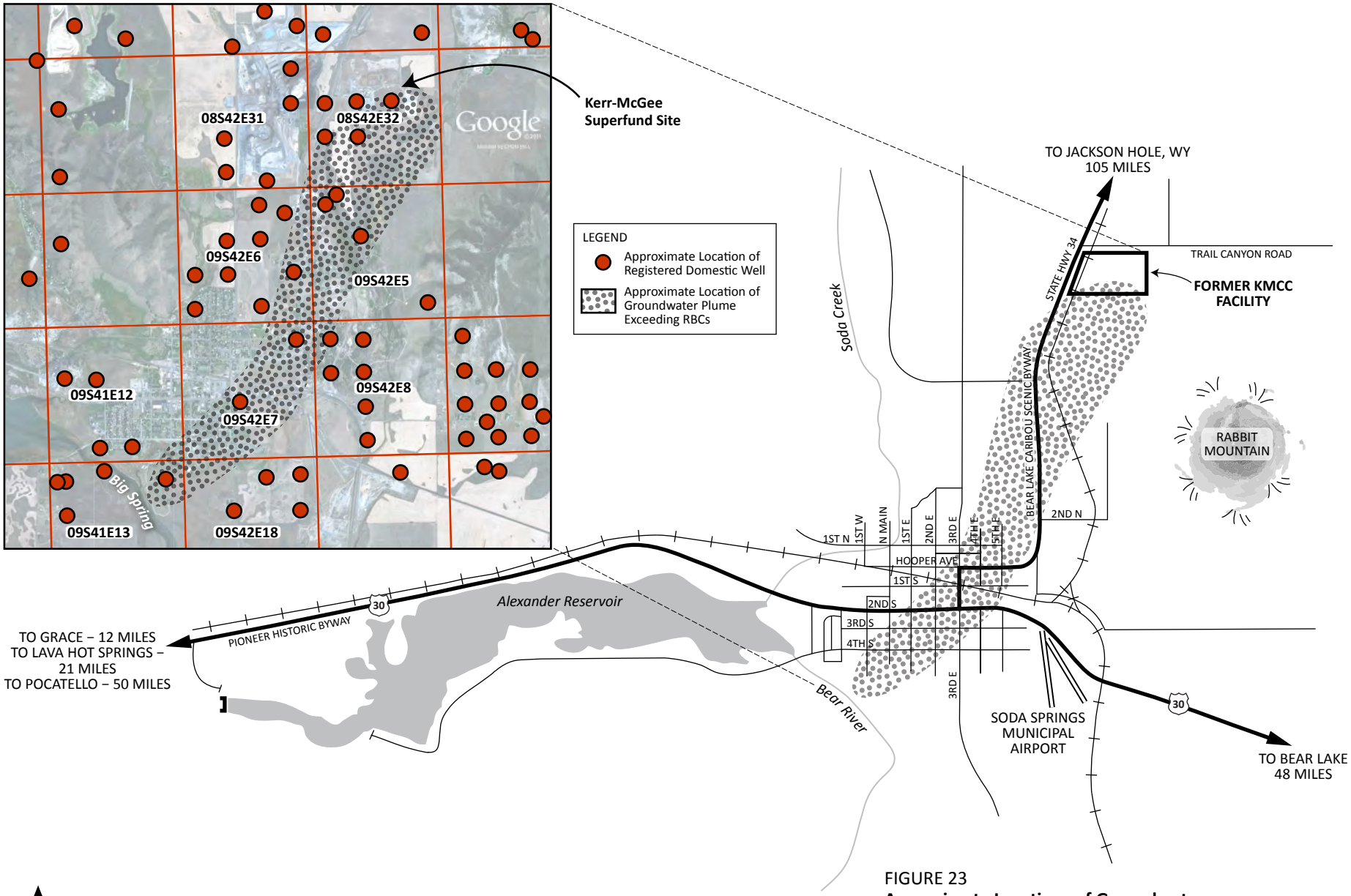
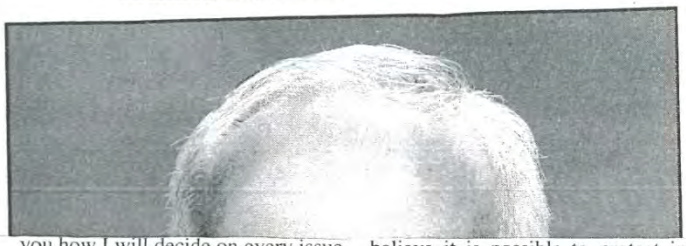


FIGURE 23
Approximate Locations of Groundwater Plume and Registered Domestic Wells
Kerr-McGee 2012 Five Year Review

Appendix A
Community Notification and Involvement

6--Caribou County Sun, Soda Springs, Idaho
Thursday, May 3, 2012



you how I will decide on every issue before the commission, but I can tell you that these principle are on what I will base my judgments.

I am anti-commission which means legislation is formed to force producers to pay a fee to sell their

believe it is possible to protect industry and natural resources at the same time. I would enjoy being your County Commissioner. I would do my best to serve the county if I were to receive this nomination. Thank you.

week," said Moore, a University of Idaho Extension soils specialist at Twin Falls.

The camp typically attracts about 70 boys and girls, Moore said, although it can take as many as 90.

The goal of the camp is to give campers basic facts about Idaho's natural resources and to encourage them to think about whether Idaho will still have them in abundance in 20 years. Campers discuss and debate natural resources issues while learning their responsibilities as citizens.

The camp registration fee, which includes bed, board and all activities, will cost $235 until May 21. The fee goes up $20 for registrations after that date. Scholarships

EPA
United States
Environmental Protection
Agency

EPA to Review Kerr-McGee Chemical Corporation Superfund Site Remedy

The U.S. Environmental Protection Agency (EPA) is preparing the third Five-Year Review of the Kerr-McGee Chemical Corporation Superfund site. Tronox LLC most recently operated the site, located on 158 acres approximately 1 mile north of Soda Springs, Idaho. Now, the Greenfield Environmental Multistate Trust LLC manages the site.

The review, scheduled for completion by September 2012, will assess the effectiveness of the waste cleanup work completed by the Kerr-McGee Chemical Corporation between 1997 and 2001. The cleanup included removing two of the three waste ponds, disposing of 13,000 yards of pond sediment, and constructing an onsite landfill. Kerr-McGee stopped all liquid wastes draining into the calcine tailings holding area and capped the tailings in place in 2001. Groundwater monitoring continues south of the Kerr-McGee plant. Reviews are required every five years at sites where the cleanup leaves waste in place.

How You Can Get Involved: EPA invites your participation and input during our review. If you have information that may help EPA with the review, please contact Bill Ryan, EPA Project Manager, at 206-553-8561 (toll free, 800-424-4372) or at ryan.william@epa.gov.Your input would be most useful to the review if received **no later than June 30, 2012**.

TTY users may call the Federal Relay Service at 800-877-8339 and give the operator Bill Ryan's phone number.

Appendix B
Documents Reviewed

Documents Reviewed

Global Environmental Technologies, LLC. 2012. *Annual Comprehensive Report of Groundwater and Surface Water Quality, Former Tronox, Soda Springs, Idaho Facility*. April 6.

Global Environmental Technologies, LLC. 2012. *Final Addendum 1 Remedy Evaluation Report, Kerr-McGee Chemical LLC, Soda Springs, Tronox Facility*. January 6.

Global Environmental Technologies, LLC. 2008. *Draft Ground Water Monitoring Network Evaluation, Kerr-McGee Chemical LLC, Soda Springs, Idaho Facility*, dated August 1, 2008.

U.S. Army Corps of Engineers. 2007. *Second Five-Year Review Report, Kerr-McGee Chemical Corp*. *(Soda Springs) Superfund Site, Caribou County, Idaho*. September.

U.S. Environmental Protection Agency. 1995. *Record of Decision, Kerr-McGee, Soda Springs*, September 28.

U.S. Environmental Protection Agency. 2000. *Record of Decision Amendment, Kerr-McGee, Soda Springs*. September 13.

U.S. Environmental Protection Agency. 2001. *Comprehensive Five-Year Review Guidance*. EPA 540-R-01-007. U.S. Environmental Protection Agency. June.

U.S. Environmental Protection Agency. 2002. *First Five-Year Review Report, Kerr-McGee Superfund Site, Soda Springs, Idaho*. September.

U.S. Environmental Protection Agency. 2008. *Memorandum; Five-Year review of Risk-Based Concentrations, Kerr-McGee Chemical Corporation (Soda Springs) Superfund Site, Caribou County, Idaho*. October 23.

Appendix C
Site Inspection Checklist

I. SITE INFORMATION

Site name: TRONOX SODA SPRINGS, IDAHO FACILITY (FORMERLY Kerr-McGee Chemical LLC	**Date of inspection: 06/12/12**
Location and Region: Soda Springs, Idaho REGION X	**EPA ID: IDD041310707**
Agency, office, or company leading the Five-Year Review: CH2M HILL, INC.	**Weather/temperature: Partly cloudy, cool, 80 degrees F**

Remedy Includes: (Check all that apply)

- ■ **Landfill cover/containment**
- ■ **Access controls**
- ■ **Institutional controls**
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ■ **Monitored natural attenuation**
- ☐ Groundwater containment
- ☐ Vertical barrier walls

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

■ **O&M manual**	■ **Readily available**	☐ Up to date	☐ N/A
■ **As-built drawings**	■ **Readily available**	☐ Up to date	☐ N/A
■ **Maintenance logs**	☐ Readily available	☐ Up to date	☐ N/A

Remarks: O&M is for the cap only. Covers inspection of the landfill cap. Landfill water level controlled by sump to concrete evaporation pond. No weeds or trees. Institutional Controls in place.

2. **Site-Specific Health and Safety Plan** Readily available ☐ Up to date ■ **N/A**
   ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks_____

3. **O&M and OSHA Training Records** Readily available ☐ Up to date ■ **N/A**
   Remarks_____Site is an OSHA Star site since 1987. No reportable accidents.

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	■ **N/A**
☐ Effluent discharge	☐ Readily available	☐ Up to date	■ **N/A**
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	■ **N/A**
☐ Other permits_____	☐ Readily available	☐ Up to date	■ **N/A**

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ **N/A**
   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ **N/A**
   Remarks: None, site is compacted.

7. **Groundwater Monitoring Records** ■ **Readily available** ☐ Up to date ☐ N/A
   Remarks: Onsite and available to review.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ **N/A**
Remarks_____

9. **Discharge Compliance Records**
☐ Air ☐ Readily available ☐ Up to date ■ **N/A**
☐ Water (effluent) ☐ Readily available ☐ Up to date ■ **N/A**
Remarks_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ■ **N/A**
Remarks_____Site is gated and a daily sign-in and sign-out log is maintained.

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ■ **Contractor for PRP**
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
■ Funding mechanism/agreement in place
Original O&M cost estimate **$1,000,000** ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: _____Nothing to report.

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing** ■ **Location shown on site map** ☐ Gates secured ☐ N/A
Remarks: Damage was observed in the fencing to the land fill perimeter fence and to the calcine cap perimeter fence.

B. Other Access Restrictions

1. **Signs and other security measures** ■ **Location shown on site map** ☐ N/A
   Remarks: Signs on all gates.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
   Site conditions imply ICs properly implemented ☐ **Yes** ■ No ☐ N/A
   Site conditions imply ICs being fully enforced ☐ **Yes** ■ No ☐ N/A

   Type of monitoring (*e.g.*, self-reporting, drive by)
   Frequency ___**Continuous**_____
   Responsible party/agency _____
   Contact City of Soda Springs, ID _____ 6/12/12 **(208) 547-2600**
   Name Title Date Phone no.

   Reporting is up-to-date ☐ Yes ☐ No ☐ N/A
   Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

   Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☐ N/A
   Violations have been reported ☐ Yes ☐ No ☐ N/A
   Other problems or suggestions: ☐ Report attached

2. **Adequacy** **X ICs are adequate** ☐ ICs are inadequate ☐ N/A
   Remarks_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ **No vandalism evident**
   Remarks_____

2. **Land use changes on site** ■ N/A
   Remarks_____

3. **Land use changes off site** ■ N/A
   Remarks: Property ownership transferred to Tronox in 2004. No change in land use.

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ **Roads adequate** ☐ N/A
   Remarks_____

B. Other Site Conditions

Remarks _____ _____

VII. LANDFILL COVERS ■ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map **■ Settlement not evident**
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** ☐ Location shown on site map **■ Cracking not evident**
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map **■ Erosion not evident**
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** **■ Grass** **■ Cover properly established** ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks**No Trees, spraying for weeds required.**

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____

7. **Bulges** ☐ Location shown on site map **■ Bulges not evident**
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** **■ Wet areas/water damage not evident**
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map **■ No evidence of slope instability**
   Areal extent_____
   Remarks: Nothing steeper than 3/1. Mostly 6/1.

B. Benches ☐ Applicable **■ N/A**

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map **■ N/A or okay**
   Remarks_____

2. **Bench Breached** ☐ Location shown on site map **■ N/A or okay**
Remarks_____
_____

3. **Bench Overtopped** ☐ Location shown on site map **■ N/A or okay**
Remarks_____
_____

C. Letdown Channels ☐ Applicable **■ N/A**
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map **■ No evidence of settlement**
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** ☐ Location shown on site map **■ No evidence of degradation**
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map **■ No evidence of erosion**
Areal extent_____ Depth_____
Remarks_____
_____

4. **Undercutting** ☐ Location shown on site map **■ No evidence of undercutting**
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ **■ No obstructions**
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
X No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☐ Applicable **■ N/A**

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
■ N/A
Remarks_____ _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance **■ N/A**
Remarks_____
_____

3. **Monitoring Wells** (within surface area of landfill)
■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks: Dedicated pumps installed in all wells.
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked G Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance **■ N/A**
Remarks_____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed **■ N/A**
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable **■ N/A**

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

F. Cover Drainage Layer **■ Applicable** ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning **■ N/A**
Remarks_____
_____

2. **Outlet Rock Inspected** ☐ Functioning **■ N/A**
Remarks_____
_____

G. Detention/Sedimentation Ponds ☐ Applicable **■ N/A**

1. **Siltation** Areal extent_____ Depth_____ **■ N/A**
☐ Siltation not evident
Remarks_____
_____

2. **Erosion** Areal extent_____ Depth_____
☐ Erosion not evident
Remarks_____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks_____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks_____
_____

H. Retaining Walls ☐ Applicable ■ **N/A**

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Offsite Discharge G Applicable ■ **N/A**

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ■ **N/A**

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   ■ **Properly secured/locked** ■ **Functioning** ■ **Routinely sampled** ■ **Good condition**
   ■ **All required wells located** ☐ Needs Maintenance ☐ N/A
   Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Purpose is to contain further migration of COC from sources to groundwater allowing for natural attenuation to reduce the overall concentrations observed in the contaminant plume. Actions taken to date have had a dramatic impact on groundwater concentrations. However, concentrations remain above risk-based groundwater performance standards in multiple monitoring wells. Continued monitoring is warranted to track decline of well concentrations in off site wells and surface water.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

No issues identified.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

No issues identified.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Collect further data to determine other possible sources of COCs that were not investigated during the RI.

Appendix D
Site Inspection Photographs

PHOTOGRAPH 1: Southern Scrubber Pond (Facing East)

PHOTOGRAPH 2: S-X Pond (Facing Southwest)

PHOTOGRAPH 3: Calcine Cap (Facing Southwest)

PHOTOGRAPH 4: Calcine Cap Fence line (Facing North)

PHOTOGRAPH 5: Calcine Cap (Facing South)

PHOTOGRAPH 6: Landfill (Facing North)

PHOTOGRAPH 7: Vanadium Plant Solvent Extraction Room Footprint (Facing Northeast)

PHOTOGRAPH 8: Vanadium Plant Decommission Material (Facing Northeast)